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bart impact program

RESPONSES OF NEARBY RESIDENTS TO BART'S ENVIRONMENTAL IMPACTS



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technical memorandum

The BART Impact Program is a comprehensive, policy-oriented study and evaluation of the impacts of the San Francisco Bay Area's new rapid transit system (BART).

The program is being conducted by the Metropolitan Transportation Commission, a nine-county regional agency established by state law in 1970.

The program is financed by the U.S. Department of Transportation, the U.S. Department of Housing and Urban Development, and the California Department of Transportation. Management of the Federally funded portion of the program is vested in the U.S. Department of Transportation.

The BART Impact Program covers the entire range of potential rapid transit impacts, including impacts on traffic flow, travel behavior, land use and urban development, the environment, the regional economy, social institutions and life styles, and public policy. The incidence of these impacts on population groups, local areas, and economic sectors will be measured and analyzed. The benefits of BART, and their distribution, will be weighed against the negative impacts and costs of the system in an objective evaluation of the contribution that the rapid transit investment makes toward meeting the needs and objectives of this metropolitan area and all of its people.

BART IMPACT PROGRAM
RESPONSES OF NEARBY RESIDENTS
TO BART'S ENVIRONMENTAL IMPACTS



JULY 1977

TECHNICAL MEMORANDUM

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PREPARED FOR
U. S. DEPARTMENT OF TRANSPORTATION

AND
U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

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PREPARED BY
DE LEUW, CATHER & COMPANY

SUBCONTRACTOR TO
GRUEN ASSOCIATES, INC.

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The survey field work was carried out by West Coast Community Surveys (Berkeley), under the direction of Ms. Selma Monsky. Mr. Emory Curtis conducted the following interviews with local realtors and newspaper reports.

The analysis was conducted primarily by Dr. Mark Baldassare (now at UCLA) and Ms. Sherrill Swan of De Leuw, Cather. Technical assistance and report production was provided by Ms. Alice Sgourakis with graphics and assembly by Ms. Merle Bessie. Dr. Somers provided statistical guidance and assisted in interpretation of findings. Drs. Carp and Wachs reviewed the findings, and Wachs also assisted Baldassare in extensions of the original analysis at UCLA. Dr. Knight and Dr. Somers revised and edited this report for publication.

A special debt of gratitude is owed the study's over 700 survey respondents, who submitted to long home interviews with interest and hospitality. Whatever productive application this study's results may find is due to the willingness of these many people to share their experiences and feelings with us and this study's users across the country.



BART: THE BAY AREA RAPID TRANSIT SYSTEM

- Length:** The 71-mile system includes 20 miles of subway, 24 miles on elevated structures and 27 miles at ground level. The subway sections are in San Francisco, Berkeley, downtown Oakland, the Berkeley Hills Tunnel and the Transbay Tube.
- Stations:** The 34 stations include 13 elevated, 14 subway and 7 at ground level. They are spaced at an average distance of 2.1 miles: stations in the downtowns are less than 1/2-mile apart while those in suburban areas are 2 to 4 miles apart. Parking lots at 23 stations have a total of 19,000 spaces. There is a fee (25¢) at only one of the parking lots. BART and local agencies provide bus service to all stations.
- Trains:** Trains are from 4 to 10 cars long. Each car is 70 feet long and has 72 seats. Top speed is 80 mph with an average speed of 38 mph including station stops. All trains stop at all stations on the route.
- Automation:** Trains are automatically controlled by the central computer at BART headquarters. A train operator on-board each train can over-ride automatic controls in an emergency.
- Magnetically encoded tickets with values up to \$20 are issued by vending machines. Automated fare gates at each station compute the appropriate fare and deduct it from the ticket value. At least one agent is present at each station to assist patrons.
- Fares:** Fares range from 25¢ to \$1.45, depending upon trip length. Discount fares are available for the physically handicapped, children 12 and under and persons 65 and over.
- Service:** BART serves the counties of Alameda, Contra Costa and San Francisco, which have a combined population of 2.4 million. The system was opened in five stages, from September, 1972, to September, 1974. The last section to open was the Transbay Tube linking Oakland and the East Bay with San Francisco and the West Bay.
- Routes are identified by the terminal stations: Daly City in the West Bay, Richmond, Concord and Fremont in the East Bay. Trains operate every 12 minutes during the daytime on three routes: Concord - Daly City, Fremont - Daly City, Richmond - Fremont. This results in 6-minute train frequencies in San Francisco, downtown Oakland and the Fremont line where routes converge. In the evening, trains are dispatched every 20 minutes on only the Richmond - Fremont and Concord - Daly City routes. Service is provided weekdays only, between 6 A.M. and midnight. Future service will include a Richmond - Daly City route and weekend service. Trains will operate every 6 minutes on all routes during the peak periods of travel.
- Patronage:** Approximately 130,000 one-way trips are made each day. 200,000 trips are anticipated under full service conditions.
- Cost:** BART construction and equipment cost \$1.6 billion, financed primarily from local funds: \$942 million from bonds being repaid by the property and sales taxes in the three counties, \$176 million from toll revenues of transbay bridges, \$315 million from federal grants, and \$186 million from interest earnings and other sources.

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SUMMARY AND CONCLUSIONS

STUDY INTENT

The purpose of this Environment Project substudy was to find out just how the people who live near BART feel about its impacts on their environment. The primary BART-related causes of these perceptions (i.e., what is noticed) and evaluations (how people feel and act in response) were to be identified, in order to inform policy makers and designers of future systems about the environmental effects of some of their decisions likely to be felt by the public.

Residents' responses were also to be compared against the technical impact assessments made earlier by the Project's analysts, to verify and refine those methods of assessment. Most "environmental" impacts of urban transit systems (e.g., noise, view, traffic danger, crime potential, etc.) are felt directly by the persons exposed, and have relatively unimportant effects on the "natural" environment. However, at present the assessments of most of these impacts of proposed transit systems depend mainly on the experience and judgments of technicians; little if any proof of how people would actually respond has been available. The intent here is to provide at least a partial remedy for that methodological weakness. This should substantially improve the credibility of impact assessments with the general public as well as with the decisionmakers themselves.

KEY CONCLUSIONS

Certainly the most general conclusion is that BART's overall environmental impacts are viewed favorably or indifferently by most of the people living very near it. This conclusion is based on reports by persons living generally within four city blocks of the system's above-ground (aerial and at-grade) lines and stations with parking lots. Further, even this sample is heavily biased toward those within two blocks (70 per cent of the sample). The fact that the population surveyed is so near to BART and therefore so exposed to its effects, in comparison with the general population of the communities served by the system, makes this conclusion all the more remarkable.

However, an analysis of responses to specific effects shows that BART is perceived to have some significant environmental impacts, both good and bad. Further, it was possible to identify some of the key contributory causes of these perceived impacts. This leads to three other general conclusions of the study:

- o Most residents of the study sites are indifferent to most specific impacts of BART.

- The effects of overflow parking at stations and BART train noise along aerial lines are widely viewed as the system's worst impacts.
- Other BART impacts appear to be generally limited to the nearest row of houses.
- Results of technical impact assessments are similar to impact evaluations by residents, but overestimate impact in some cases.

Other more specific findings in support of these conclusions are presented in following paragraphs, after a brief description of the approach and the sites in which the study was conducted.

APPROACH

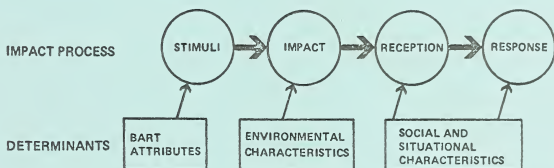
The project's earlier studies had indicated that BART's environmental impacts depended on highly specific factors which varied widely from place to place. In order to gain the needed understanding of the causal process, the response study focused on site-specific case studies. Home interviews, observations, and other data collection activities were conducted in ten small residential neighborhoods along BART. All abutted the transit right-of-way, and most extended to about four blocks away. Each was selected primarily for its representation of conditions commonly found both in the Bay Area and elsewhere, to maximize the usefulness of the findings. From about 50 to over 100 interviews were conducted in each site, for a total of about 700.

The analysis involved both single sites and comparisons among the sites. Within each site, responses to the different types of impact were compared to the prior assessments of impact for that site and the importance of factors such as distance from home to BART were evaluated. Between sites, response distributions were compared for sites which differed with respect to a particular feature such as BART's line configuration or the presence or absence of a parallel railroad. In such between-site comparisons other potentially important factors were kept as similar as possible, both by site selection and through statistical controls. This allowed estimates of the effect of the particular feature of interest (BART aerial versus at-grade line, etc.) on the response to various impacts.

Both the interviews and the analysis itself followed a logical sequence in which the results of each step set the context for the next. First each neighborhood was described and its environmental quality evaluated, in terms of variables both independent of and related to BART. This provided an indication of what environmental factors were felt to be important and whether BART was likely to be a major concern. Next BART's overall (unspecific) effects were judged; then with this general evaluation as a frame of reference, BART's effects on a wide range of specific environmental qualities were evaluated in detail.

Once this perspective had been fully developed for the full range of impacts in each site, comparisons of response between selected sites were conducted to identify the major causes. This analytical approach follows a general model of the impact-response process shown below:

IMPACT PROCESS AND DETERMINANTS



These contributory causes, or determinants of response, included first key attributes of BART itself, then features of the neighborhood which were felt to be influential either in masking or highlighting BART's effects, and finally some characteristics of the respondents themselves which might influence response.

THE STUDY SITES

The ten sites were divided into three groups: those adjoining BART stations, at-grade lines, and aerial (elevated) lines. No sites were near BART's subway lines or stations, since the earlier impact assessments had uncovered no indications of significant impacts in those areas. Within each of the three site groups, the sites differed in some important respects but were acceptably similar in others so that the desired site comparisons could be made effectively.

Station Sites

Three of the residential study sites adjoin aerial BART stations, all with large parking lots. The Daly City site is of interest for its role as the terminus of BART's shortest line from the San Francisco CBD, thereby serving a very large residential population. This includes many commuters from more distant suburbs who drive to the station -- much as might be expected at the terminus of a "starter segment" of a future system elsewhere. This station generates substantial traffic and has a large overflow of parked cars onto the nearby residential streets. The Concord site is quite similar both socially (moderate education and income)

and with respect to BART: terminal station, substantial traffic, overflow parking. However, it is in an outer suburban area and was found to include fewer BART users; it is an "ultimate" terminus rather than a "starter segment."

The El Cerrito Plaza station site is reasonably similar to the other two both physically and socially, but contrasts sharply in BART's apparent effects: its patronage is much lower, and the parking lot is of ample size although not larger than the others. There is no overflow parking or any other obvious BART-related problem. However, in appearance and operation it is very similar to the others.

Aerial Line Sites

Five of the sites adjoin aerial trackways. Two are in Albany, where the narrow BART right-of-way has been heavily landscaped as a "linear park". One site faces the park across the street; the other is just across the BART tracks with the closest homes backing up to the right-of-way, and their view of the park is blocked by high fences. Two others, San Leandro and Hayward (North) are similar to these, but have no linear park. In all four sites BART parallels railroad lines, none of which is heavily used. As with the station sites, all are single-family residential areas, with limited variation in socio-economic characteristics.

In the fifth aerial line site, Oakland, the BART track is above the median of Grove Street, a busy arterial street. The location is a predominantly Black, low income neighborhood of older but not excessively deteriorated homes and flats.

At-Grade Line Sites

These final two sites are both of low density (mainly single-family) suburban housing. The residents of the Richmond site are predominantly Black and low-moderate income. BART adjoins the backyards of its nearest homes. At Hayward (South) BART also adjoins backyards; however, income is higher and the population is generally white. In both, BART parallels a railroad line of low (Richmond) to moderate use (Hayward).

Taken together, these ten sites represent the impact situations found most commonly along BART and many of those likely to be found elsewhere. In addition, their similarities and differences allow a variety of comparisons to assess the effects of transit planning options such as line configuration, location with respect to homes and other transportation facilities, and parking lot capacity versus patronage.

MAJOR FINDINGS

More specific conclusions can best be presented in a logical sequence in which each step provides a frame of reference for the next. This begins with the most general evaluations of BART's significance in the context of the other major environmental influences in the neighborhood. Next BART's overall effects are judged, followed by evaluations of specific types of impact.

Finally, conclusions are drawn regarding the contributing causes of BART's perceived impacts.

BART in Context

- When compared to other things, BART-related factors are not often rated as major influences at most of the sites.

This conclusion is based on respondents' ratings of the quality of their neighborhood with respect to a variety of factors, some of which were related to BART. In general, factors such as "safety from crime" and "quality of schools" were more frequently mentioned as being very good or very bad than were specific BART-related aspects or the general item "having the BART line nearby." However, there were exceptions to this general pattern: At Daly City and Concord stations, two of the factors most consistently rated as bad or very bad were traffic and parking problems (which are known to be due to BART), and in Albany respondents were more often unhappy about "having BART nearby" than with most other neighborhood characteristics.

Overall Attitudes Toward BART

Respondents happy with BART overall outnumbered those unhappy by wide margins; fewer but still more were happy than unhappy specifically with its local environmental effects.

This conclusion is drawn from two questions on overall attitudes toward BART -- one considering everything about the system and the other focusing only on its environmental effects on the respondents' neighborhoods. Those reporting unhappiness were a distinct minority in all sites. Those happy with BART overall ranged from 49 to 82 percent by site; corresponding percentages of unhappy respondents were 10 to 32, with the remainder indifferent. Those satisfied with the system's nearby environmental effects ranged from 27 to 59 percent; unhappy were 2 to 32 percent.

This indicates at least two important things. First, BART and its environmental effects are not a major concern to most nearby residents. Second, its environmental effects are perceived somewhat less favorably than is the system overall, but only enough to change some responses from happy (overall) to indifferent (environmental) rather than unhappy.

Memories of BART Construction

- Persons who have lived near BART since it was built tend, by a small majority, to remember the effects of its construction on their neighborhood as "bad" or "very bad."

A majority of respondents living within one block of BART during its construction five to ten years ago rated the overall effect of BART construction, as well as most of its specific effects, as adverse. A general exception was found in the at-grade line sites, where memories were substantially more favorable.

For the full four-block deep sites, the overall effects of BART construction were somewhat less negatively appraised (more indifference) but reports of adverse effects were still a near-majority in most sites. Most specific impacts are also remembered as adverse by most respondents. Impacts most often cited as adverse included dust and dirt, noise, truck traffic, torn-up streets, and removal of houses. From this it is concluded that BART construction did cause some substantial and widespread discomfort among residents within a few blocks of the right-of-way. It is impressive that these adverse effects are remembered in detail by so many people, even though BART construction in their neighborhoods ended five or more years earlier, and even though their overall attitudes regarding the system's current impacts are relatively favorable.

- Acoustic: BART train sound is judged to be an adverse effect by most residents living close to the aerial lines.

This was the most frequent complaint at the aerial line sites. Vibration is a lesser but still significant problem in the same sites. Persons living within about one block of the aerial lines were much more likely to judge both sound and vibration to be problems than those living even a little farther away. Acoustic impacts do not appear to be major problems either along the at-grade lines or around stations with parking lots.

- Atmospheric: BART's perceived effects on atmospheric aspects of the environment, notably local air quality, appear negligible.

Perceived effects of BART station-area traffic on air quality are insignificant except at Daly City, where a significant minority report adverse effects. Since no actual effects are likely to be occurring (according to the technical assessment) and also since these opinions are not borne out by responses at another similar station (Concord), we conclude that residents are either responding to the effects of the adjacent freeway or are using this item to emphasize their unhappiness with the overall effects of the parking overflow there.

Television reception along the aerial lines is apparently being disturbed slightly by passage of the BART trains. Although evidently occurring along many miles of track, the minor magnitude of this effect is suggested by the almost total lack of reported actions taken by residents to stop it.

- Natural Features: BART landscaping was viewed as a substantial benefit where it was most extensive; no other significant effects were reported on the "natural" environment.

In most sites, indifference to BART's limited landscaping improvements was the most common response. However, at the Albany linear park site, where landscaping was most extensive, fully 70 percent of the respondents whose homes faced the park and BART's aerial line reported favorable effects. Substantial minorities in other sites with substantial landscaping improvements judged the "natural" effects as positive.

- Neighborhood Travel: High levels of adverse effects on traffic flow, safety, parking, and getting around in the neighborhood were reported at both terminal stations.

As expected, respondents at the two high-patronage stations with overflow parking were more negative in their response to these parking and traffic-related impacts than to any other BART effect. This contrasted sharply with the lack of any such concerns at the El Cerrito Plaza station, where BART parking and traffic were effectively separated from the adjoining residential area.

Some concern had been expected over the "barrier" effects of the fenced at-grade BART lines. The incidence of such concern was found to be significant but not a large proportion of the responses (about 20 percent), perhaps because in both at-grade sites studied there was a pedestrian bridge over the BART tracks within a few blocks of all homes.

- Social Environment: No major BART effects on crime or residential composition were reported, but the loss of privacy in backyards exposed to view from BART trains was rated as adverse by many of those affected.

In every line site with backyards adjoining BART, a large proportion of the respondents so affected felt the effect to be adverse. This was especially strong at the aerial lines, as expected. However, very few reported any behavioral changes, such as changing use of the yard, landscaping, or building fences to block the view.

- Visual Quality: BART's visual effects are rated as good or neutral by a large majority in all sites; however, some negative feelings are reported about effects on view and shadows along the aerial lines abutting backyards.

In most sites the majority of respondents were indifferent to BART's effects on neighborhood appearance. This was generally true even for those whose homes were nearest the right-of-way. This suggests that most residents do not share the study staff's judgment of the adverse effects of BART's visual contrast with its residential surroundings. At the same time, however, effects on view from inside the home were rated as adverse by most of the people whose yards adjoined the aerial lines, as anticipated. Many also judged the aerial trackway's shadow effects on their homes and yards to be adverse.

Contrary to expectation, although the BART parking lot lighting was noticeable from nearby homes, most residents were indifferent to it and many even viewed it as a benefit. This was also true along the (lighted) linear park.

Responses to Impacts Away From Home

- Respondents were aware of BART as a regional visual feature and liked it, but the system appears to have little effect on their understanding of the region's layout away from their neighborhoods.

Most of the respondents reported that BART was something that they noticed regularly in their travels outside their neighborhoods. Almost all liked what they saw; in fact, from 35 percent to 61 percent of the site samples judged BART's regional appearance as "very good," and most of the rest rated it "good." Respondents particularly noticed and appreciated the appearance of the trains and stations.

Knowledge of station names and locations was generally high, although a substantial minority of respondents could not correctly distinguish between distant suburbs which did and did not have BART stations. At the same time, BART seems to have increased residents' understanding of the Bay Area only for a small proportion of the respondents, according to their own evaluations. About 20 percent reported that they felt "more aware" of different parts of the Bay Area because of BART. This provides only weak support for the study staff's original hypothesis that BART's service, appearance and widely publicized map may have helped to improve the population's general understanding of "where things are" (especially the small outlying cities served by BART) in the region.

INTERPRETATION: FACTORS CONTRIBUTING TO IMPACT

- BART attributes most likely to result in unhappiness among nearby residents are overflow parking and intrusive traffic at stations and the aerial configuration of trackways.

Respondents near an aerial line are consistently much less satisfied with BART's overall effect and with many of its specific impacts around the home than are those near its at-grade lines. Similarly, among station-area respondents there are dramatic differences in satisfaction between those who do and do not experience BART parking and traffic intrusion. No other BART attributes appeared to have such strong effects; a doubling of train frequency, for example, was not found to have a substantial effect.

- The use of landscaping and particularly the "linear park" along aerial lines is widely appreciated but does not appear to materially offset negative reactions to BART's more adverse effects.

Response to the Albany linear park was very positive, both in terms of evaluation and reported active use. However, the respondents in the Albany sites were still not more favorably disposed to BART overall (or to its other specific impacts) than were residents of other sites similarly situated but without such a park. It appears that the park is perceived as an entity quite distinct from BART itself, rather than part of a BART "package." Moreover, the same lack of offsetting benefit was true for respondents in Concord, where the aerial line entering the station was more heavily landscaped than elsewhere. It is therefore tentatively concluded that although landscaping is shown to be a valued benefit, it has not substantially improved overall perceptions of BART's impacts.

- Among environmental characteristics, distance from BART was most important in determining residents' evaluations of impact.

BART's impacts appear to be generally limited to the nearest row of houses except along aerial lines, where problems with noise extend as far as two to three blocks away. This closely approximated the predictions from the technical assessment of BART train sound's effects. Aside from noise, the interposition of homes and other structures seem to create effective barriers to most impacts beyond the first row of homes. The main exception is the approval of the linear park, which was found to be strong throughout the two nearby sites.

At stations, it appears that perceptions of traffic and parking problems are high throughout the site -- that is, as far away as the problems actually occur. However, where such problems do not exist (e.g., El Cerrito), the perception of both good and bad impacts is insignificant beyond the first row of homes.

- Other significant environmental factors include the level of background activity in the neighborhood and the orientation of the nearest homes.

High levels of background activity such as parallel arterial street traffic appeared to be related to less negative evaluations of intrusive impacts, particularly BART train sound. In addition, respondents whose homes back up to rather than face the right-of-way tended to be more negative in their appraisals of the system's overall effects, although, contrary to expectation, not of noise or effects on view.

- Except for use of BART, no characteristics of the respondents themselves were found to be related to impact perceptions to any important degree.

Respondents who were regular BART users tended to be substantially less often critical of the system's environmental effects on their homes. However, as a group they were characteristically still critical of such effects in the same general pattern as were non-users.

Racial and economic factors were not found to have any meaningful effects on response, nor did the respondent's sex. All else equal, older respondents

tended to be slightly less critical, while persons of longer tenure in the neighborhood were slightly more critical than newer residents.

IMPLICATIONS: LESSONS FOR THE FUTURE

1. Geographical Focus

This study's findings suggest that in the case of modern systems similar to BART, assessments of rail rapid transit-induced environmental impacts can be very tightly focused geographically. Virtually all impacts appear to be negligible except in the block or two immediately adjacent to the line right-of-way and wherever station parking is inadequate. Therefore assessments should in general avoid the needless complexity of estimating effects on broader corridors, unless system characteristics are markedly different from BART.

2. Impact Assessment Methods

The conventional technical impact assessment methods employed earlier in the BART Environment Project appear to be generally accurate in their "prediction" of effects as perceived by residents. However, the survey results do indicate that the technical assessments tended to over-estimate the degree to which both overall and specific impacts would be judged as important by those exposed, either for good or ill. This suggests that standard methods of making technical predictions of impact may be unduly conservative. For example, impacts such as visual contrast and even train noise are not perceived negatively as frequently by those exposed as had been predicted. Naturally, the more severe the predicted impact, the greater the difficulty of achieving a design solution acceptable to local residents. This study's results should aid substantially in improving the accuracy and credibility of such predictions of impact, thereby helping to simplify the planning process while still properly protecting the residential environment.

3. Aerial Lines

The environmental effects of aerial trackways are important and should not be overlooked. Obviously no blanket prohibition of their use is either feasible or justified by this study's findings. However, the findings do describe the nature and extent of impacts likely to be associated with aerial lines. These should be understood and considered carefully in any city's weighing of the pros and cons of alternative routes and configurations. The worst situation seems to be one in which a high-speed aerial line abuts backyards in quiet residential areas. Most of the impacts are likely to be avoidable, however, through line location in non-residential areas, use of wider rights-of-way, and addition of sound controls such as low barrier walls on the structure.

4. Above-Ground Stations

Provisions for station access by auto are clearly the most important consideration from the point of view of nearby residents. Parking lots of the sizes employed by BART (about 500 - 1500 cars) do not seem to be inevitably the source of major problems. However, when traffic intrudes into residential neighborhoods and parking overflows from the designated lots, problems definitely do result and are perceived as significant by most nearby residents. This poses a dilemma of major consequences: If a station is to be built in a residential area, the decisionmaker must run a major risk of either destroying the social fabric through high-cost and possibly excessive demolition for a very large parking lot or having insufficient parking and hence both disrupt the neighborhood and discourage transit patronage. BART is currently attempting to solve this dilemma by constructing a three-level parking structure at Daly City, but this was too late for incorporation into this study. Further monitoring of this attempt would be useful.

Emphasis on feeder systems such as buses would help to ease this problem. However, their high passenger-mile cost resulting from low market coverage in low-density residential areas makes them impractical in many areas, including most suburban communities served by BART. Too, in such areas only a small proportion of patrons live within walking distance of a transit station. For these reasons, and particularly in view of the difficulty of accurate station-by-station patronage forecasting, it seems prudent to locate stations entirely outside (although near) residential areas whenever possible, and thereby avoid the dilemma altogether. No significant benefits would be lost, in general, and some major environmental concerns would be eliminated. When this is impossible, this study's results make it clear that major emphasis should be placed on efforts to provide for ample parking or stringently restrict auto access.

5. Sociological Research Methods

This study's design draws heavily from the emerging body of quasi-experimental techniques for policy and program evaluation, in combination with social survey methods. It has proven to be quite effective, and may provide some useful tools to other social and environmental researchers. It has demonstrated, for example, that a group of highly focused yet systematically related survey "case studies" (matched to fit prior hypotheses) can yield some strong indications of the major causes of differences in those findings from one case study to another.

A novel aspect of the study design is its use of parallel comparisons of survey data from two (or more) pairs of sites wherever possible in order to increase confidence in the findings. A procedure for estimating statistical significance of differences in such parallel comparisons was developed and applied, and is apparently an original contribution to the statistical literature. The procedure demonstrates that the study's use of multiple

comparisons results in a major improvement in statistical significance of the findings, indicating that small-sample data can be used in such a design without the generally-expected lack of reliability. This is an important finding. It indicates that this hybrid type of research design, combining many of the best features of intensive case study methods and multivariate statistical survey techniques, may be an attractive alternative to either of these for studies of complex social processes.

1. INTRODUCTION

OBJECTIVES

The purpose of this study is to assess the subjectively perceived environmental impacts of the Bay Area Rapid Transit system. Taking a comprehensive view of this general aim, the study has sought to gauge the importance of a broad range of environmental effects, assess the effectiveness of an equally broad array of conventional technical impact assessment techniques, and identify the key forces behind the importance of those impacts as viewed by nearby residents. Several explicit objectives guided the study:

1. To identify the importance of BART's environmental impacts as judged by residents exposed to them.
2. To compare residents' evaluations with study staff's technical impact assessments to ascertain whether and how the technical assessments can be used as indicators of actual effects on residents.
3. To identify the BART attributes which most strongly influence residents' views of the impacts.
4. To estimate the extent to which factors other than BART influence residents' views.
5. To derive, from the findings, implications for future rapid transit planning, design, construction and operations.

STUDY BACKGROUND

In Phase 1, data were collected and analyzed which provided a detailed description of environmental impacts attributable to BART. These impacts were determined by instrument measurements (noise, vibration, air quality), by discussion with experts and local officials (safety, security, natural environment) and by professional judgment (aesthetics). Except for direct observation and a very limited, informal set of small-group interviews, no attempt was made to discern how the people subjected to most impacts actually felt or what they did about them. From that Phase 1 study, therefore, it was not really known whether residents even perceived all of the impacts which were identified as "significant."

Most types of environmental impact can be assessed to some degree without observing or asking the opinions of the persons affected. In some cases this is quite adequate; impacts on flora and fauna, soils, geology, and water systems are examples. For other types of impact, however, the responses of people exposed to the impact are central factors in defining its intensity and importance. Sound, vibration, safety, security, aesthetics and physical barrier effects are examples of impacts largely defined by how people tend to respond to them.

For some impacts, laboratory research and field experience have led to standards or guidelines of impact "acceptability" based on response. In the case of local air quality, maximum allowable pollutant levels may be set, based on observed or theorized relationships with incidence of certain diseases. With sound, levels of irritation, pain and physical damage have been estimated in laboratory tests. However, these standards tend to be tentative or specific to highly idealized conditions and are thus not necessarily valid in real situations. With other impact categories such as aesthetics, indirect measures based on professional judgment are often used for assessment. The validity of these is even less certain, since such procedures typically rest on one of two assumptions which may be wrong: One, that the professional's judgment accurately reflects that of the person actually affected; or two, that the professional's judgment is in some sense "better." Clearly, we hope that the professional's judgment is more accurate or better than that of others, but tests should be made where possible.

This study element is included in recognition of the importance of personal responses in environmental impact and the need for comparison with accepted standards and the judgment of professionals. Some basic work was done in Phase I. A general model of the impact-response process was developed from the literature of environmental psychology and helped to illuminate the relationships between response and its determinants, including, but not limited to, the impacts themselves.¹ A preliminary program of response assessment (community monitoring) was conducted using BART complaint files, newsclippings, key informants and unstructured group interviews; this provided early indications of major public concerns in different kinds of neighborhoods near some of BART's different impact-causing configurations (aerial guideway, subway, station areas, parking lots, etc.).² Finally, an exploratory statistical analysis of data from a 1972 "pre-BART" survey of residents near BART was made.³ This analysis related early expectations of impact to some of their possible causes.

The Phase I analysis of available pre-BART systemwide survey data indicated that only general conclusions were possible, regarding highly localized phenomena such as BART's specific environmental impacts and their causes, from such large-area survey data. This suggested the need for a more geographically focused Phase II survey. In addition, in the Phase I studies of direct impact, it was concluded that impact severity

¹Carp, Frances, Theory Background for Study of BART's Impacts on Human Perception and Response, DOT-BIP-WP 23-4-76, Berkeley: Metropolitan Transportation Commission, 1976.

²Curtis Associates, Community Monitoring, DOT-BIP-WP 22-4-76 Berkeley: Metropolitan Transportation Commission, 1976.

³De Leuw, Cather & Company, Analysis of Pre-BART Urban Residential Environment Survey, BIP-WP 24-4-76, Berkeley: Metropolitan Transportation Commission, 1976.

was determined by highly location-specific conditions, such as background sound levels, visual context, and crime and traffic levels. In order to develop the needed degree of understanding of impact as felt by those affected, it was decided that the Phase I systemwide analyses of impact must be complemented by a number of site-specific case studies involving a representative set of different environmental contexts and types of impact.

REPORT ORGANIZATION

The remainder of the report is divided into three primary sections. These deal respectively with design issues, including the study approach and study site characteristics; residents' response to BART's impacts; and findings on the causes of the impacts as perceived. Conclusions including implications for use in planning elsewhere were presented in the initial chapter Summary and Conclusions.

The reader who is interested primarily in findings and only minimally in study methods may wish to skip all but the first page of Chapter II (Study Design and Conduct). This may be done without major risk of misinterpretation of the later chapters. In addition, Chapter III (Case Study Sites) may be skimmed for a general indication of the important differences among the ten study sites.

The section on responses is composed of several chapters dealing with different issues. Chapters on findings are presented first for overall effects, then for specific types of impact around the home and neighborhood, and finally for impacts occurring outside the residential environment.

Causal findings focus first on BART's own attributes such as line configuration and provision of parking lots, then on physical characteristics of the neighborhood, and finally on other factors such as the respondents' use of BART and socio-economic characteristics. This chapter sequence thus forms a logical progression from general concerns to specific explanatory factors, providing the reader with a general context at each progressively more specific step in the analysis.



II. STUDY DESIGN AND CONDUCT

RESEARCH APPROACH

The study involved a detailed analysis of residents' perceptions of BART's impacts in ten small sites adjoining BART stations and trackways. The selected sites averaged four blocks square and represented typical residential environments with a variety of impact-producing conditions. The overall strategy was a hybrid one combining some features of statistical quasi-experimental research designs and of the intensive case study methods of the social sciences.

A variety of techniques was used for data collection and interpretation. The professional assessments of impact conducted in Phase I¹ of the Environment Project and updated in Phase II² were employed in two ways: first in site selection to allow inter-site comparisons, and second as a basis for comparison with residents' responses within each site. Further on-site observations and census data were also used in site selection.

The study's central activity was a formal home interview survey. This survey was conducted within each of the sites to ascertain perceptions of impact by, and characteristics of, the population living adjacent to the sites. Second, a program of informal interviews with knowledgeable local real estate and news media personnel was conducted to confirm and add further perspective to the survey findings.

Third, an in-depth case study was conducted for each site. For this purpose, a detailed description of the sites and their populations was compiled. Finally, professional assessments of BART's impact were compared with various indicators of the residents' perceptions of those impacts.

Responses were compared between sites on the basis of known differences in impact or some other relevant feature. This provided a perspective on the individual sites and allowed judgments regarding the importance of specific factors in influencing perceptions of impacts. Multivariate statistical analyses were also used to identify effects of certain factors.

SITE SELECTION

Approach

Case study survey sites were chosen to represent impact conditions both characteristic of BART and potentially of interest elsewhere. The number

¹Gruen Associates, Inc. and De Leuw, Cather & Company. Environmental Impacts of BART: Interim Service Findings. BART Impact Program Report FR-2-4-75.

²Berkeley: Metropolitan Transportation Commission, 1976.
_____, Phase II Addenda to Direct Impacts. BART Impact Program Report WN-2-4-77. Berkeley: Metropolitan Transportation Commission, 1977.

of acceptable candidates was further limited by several within-site requirements, including:

- Uniform BART configuration adjacent to site (e.g., aerial trackway).
- Uniform land use and environmental characteristics (e.g., low density single-family residential).
- No unusual or major environmental impact other than BART.
- No unusual topography or land development
- Homogeneous population characteristics.
- Enough housing units for survey sampling.
- Site deep enough for testing effect of distance from BART.

In addition, it was desired that site pairs be similar in most relevant respects to allow tests for the effects of specific differences in impact conditions on the survey responses. Control factors considered in the selection process are listed in Table II-1.

Table II-1
CONTROL FACTORS CONSIDERED IN CASE STUDY SITE SELECTIONS

<u>BART</u>	Track configuration (aerial, embanked, subway)
<u>Attributes</u>	Train frequency (trains per hour)
	Station parking (lot size and use; overflow)
	Station design (representative or unique)
<u>Adjacent</u>	BART-adjacent transportation (mode and intensity of use)
<u>Environmental</u>	Other nearby transportation (nearness of freeways, etc.)
<u>Characteristics</u>	Nearby nonresidential activities (commercial, industrial)
	Residential density (one-family, mixed, apartments, hi-rise)
	Ambient sound and vibration
<u>Population</u>	Income (as indicated by census block housing value and rent)
<u>Characteristics</u>	Ethnicity (census block percent Black; tract data for Hispanic)
	Age structure (percent young, elderly)

Sites Selected

Ten sites were selected, of which three were at BART stations and seven along the trackway. General locations are displayed in Figure 11-1. The major characteristics of these sites are summarized in Table 11-2. Detailed physical descriptions and vicinity maps for each site are provided in Chapter III, along with characteristics of the respondents and their evaluations of their neighborhoods.

Table 11-2
CASE STUDY SITE CHARACTERISTICS

<u>Site</u>	<u>Location</u>	<u>BART Facility</u>	<u>Other Key Features</u>
1	Daly City	Aerial station, terminal	Severe parking overflow
2	Richmond	At-grade line	Backyards abut BART
3	El Cerrito	Aerial station	Next to shopping center
4	Albany	Aerial line	Backyards abut BART
5	Albany	Aerial line w/linear park	BART & park across street
6	Oakland	Aerial line	BART in middle of street
7	Concord	Aerial station, terminal	Some overflow parking
8	San Leandro	Aerial line	Backyards abut BART & RR
9	North Hayward	Aerial line	BART & RR across street
10	South Hayward	At-grade line	Backyards abut BART & RR

THE HOME INTERVIEW SURVEY

Survey Sample Design

Sample Sizes: The targeted total number of completed household interviews was 700. This was determined through joint consideration of the interview content requirements, number of desired study sites, statistical requirements, and cost. Within this total sample, a sequential sampling strategy was employed in order to maximize the number of sites which could be included with an acceptable level of detail in each. This strategy involved initial assignment of 50 interviews to most sites, 100 to some, and the remainder held in reserve. These reserves were later assigned in multiples of approximately 50 based on review of early interview returns, which indicated the sites with greatest variation in response to key impacts. Resulting interview targets were approximately 50 households in six sites and 100 in the remaining four.



Stratification: The project's earlier studies indicated that most of BART's environmental impacts rapidly decrease in intensity with increasing distance from the line, even within the nearest few hundred feet. Interviews up to several blocks from the BART right-of-way would be required in order to verify this. However, since most perceived impacts were expected to fall only within the first one to two blocks, a simple random sample over a wider area would include a large proportion of respondents subjected to relatively little impact. This would unduly limit the statistical analysis of differences in response among those actually subjected to BART's most severe impacts, particularly with the small sample sizes used in this study.

To minimize this problem, each site was stratified by distance, with more respondents drawn from the strata closer to BART. Each stratum was of approximately equal depth from site to site. Depths of the different strata within each site were also similar.

Within each stratum, numbers of sample points differed. However, in general the stratum depths and target sample proportions were similar for all sites, as follows:

<u>Stratum</u>	<u>Percent of Sample</u>	<u>Depth</u>
1	40	First row of dwellings
2	30	~250' (about one standard block)
3	20	~300'
4	10	~300 - 400'

One site (#4 - Albany East) included an additional stratum somewhat farther from BART, as a test for any perceptions of impact in locations completely outside the expected impact zone. Another site (#5 - Albany West) had only the two strata nearest BART because of its focus on a specific issue, the effects of a linear park, for which only the views of respondents closest to it are relevant.

Selection of Households: Within each stratum of each site, all residential units were identified by street address. In single-family areas utility company address maps were used for this purpose; otherwise addresses were listed by field inspection. These dwelling unit addresses formed the stratum populations to be sampled. For sampling purposes the addresses were listed in numeric order by street.

The sample drawn included the number of desired interviews plus a standard allowance for nonresponse. Within each stratum a varying sampling interval was used for the selection of one household after another, based on the required average interval (number of households in stratum population divided by number to be drawn) plus a random number drawn from a range typically of ± 3 . This insured against the possibility of systemwide bias.

Sampling rates differed among strata and sites, ranging from .06 to .80. Wherever possible, a site was extended in length along BART in order to reduce the sampling rate. However, in some cases a high rate was necessary, particularly in the first stratum, because of low residential density and barriers to site expansion such as change in BART configuration or land use. Sampling rates by stratum and site are detailed in Appendix 1.

Selection of Respondents: One respondent per household was interviewed. A representative mix of respondents by time spent at home, age, and sex was desired. Cost and complexity precluded rigorous probability sampling on these parameters because of the number of appointments and callbacks required to interview respondents identified by probability methods on the initial visit but not at home. A simpler alternative was adopted, which allowed an interview on most initial visits. This procedure operated as follows: of those at home at the time of initial contact, the youngest adult male was selected as that household's respondent. If no male was at home, then the eldest woman at home was selected. No substitutions were allowed thereafter, even if this person refused to respond.

This procedure had been used successfully in prior studies.¹ It relies on a fairly commonly observed relative probability that household members of different ages and sexes will be found at home. According to this rationale, adult males -- especially the youngest -- tend to be home least and so to avoid their under-representation they should be interviewed whenever encountered. Use of this procedure allows a significant unit cost reduction and consequently greater number of interviews. These are especially significant gains in the context of increasing difficulty in obtaining satisfactory survey interview completion rates.²

Interview Content

The survey form is presented in Appendix 2. The selection of content and development of final wording and format of this survey instrument were a major activity. Several steps were involved:

- Identification of major response topics.
- Specification of analysis objectives.
- Identification of constraints on methods and scope.
- Analysis design, item development, and three cycles of pretests.

Senior project staff, MTC counterparts, and consultants in sociology, psychology, statistics, survey methods, and community planning research

¹Apparently undocumented in the literature, this useful procedure has been attributed to the Field Research Corporation.

²Cf. "Report of the American Statistical Association Conference on Surveys of Human Populations." American Statistician 28 (1974):30-34.

participated actively in this entire task. All were experienced in the development and use of surveys. Extending over several months, this allowed the incorporation of a variety of relevant and complementary perspectives and capabilities.

Major response topics likely to be encountered were identified through a combination of analysis of 'pre-BART' survey data,¹ review of the Phase I BART system descriptions² and impact findings,³ further informal field reconnaissance, and focused discussions with several small groups of residents along the system.

The resulting topics were many. Sound and vibration from BART trains were expected to be most important along lines; traffic and potential crime were anticipated as major concerns around stations. Visual intrusion of the system's physical facilities was expected to be an almost universal concern. However, the full range of potential impacts, both good and bad, was so broad and varied from site to site that both free-response items and specific topic coverage were deemed necessary in order to avoid possible bias in the topics which generated response.

Analysis objectives were taken from the project's original study design with minor adaptations and refinements based on interim impact findings. Briefly, these objectives were to attempt resolution of the following issues:

- Perspective: Are BART-related effects considered important in comparison with other environmental quality determinants?
- General attitude toward BART: Is BART specifically identified as a major environmental concern?
- Specific effects: What specific BART impacts are significant, and how is this significance manifested?
- BART as cause: What is the effect of presence of specific BART attributes on residents' responses?
- Environmental sensitivity: How do physical characteristics of the respondent's environment influence BART's perceived effects?
- Personal factors: How are characteristics of the individual related to perception of and response to impacts?

Constraints on the interview design arose in a number of ways. Some of these were related to research cost. Others included limitations

¹Analysis of Pre-BART Urban Residential Environment Survey. Op.Cit.

²De Leuw, Cather & Company. BART and Its Environment: Descriptive Data. BART Impact Program Working Note. Berkeley: Metropolitan Transportation Commission, 1976.

³BART and Its Environment: Interim Service Findings. Op.Cit.

of survey methods, such as interview length and types of questions which "work". Still others were statistical, particularly the demands of analytical methods on response formats. Cost limits dictated the sample sizes and number of sites. A one-hour interview was considered a maximum and a combination of fixed-category and open-end response formats was believed to be most efficient.

The tasks of analysis design and question development were conducted jointly in several cycles because of their mutual dependence. Each cycle resulted in a questionnaire draft which was pretested in the field. Three such pretests were conducted, each of which resulted in improvements both in item construction and content. All staff and consultants reviewed each draft and its results.

The final version of the questionnaire (Appendix 2) is divided into sets of items addressing each of the study's key concerns. These sections may be generally described as follows:

1. Evaluation of neighborhood environment
2. General awareness of and attitude toward BART
3. Effects of BART construction
4. Current specific effects of BART in operation
5. Effects of BART away from neighborhood
6. Use of BART
7. Effects of BART on mobility (moving behavior)
8. Personal exposure to impact
9. Individual characteristics

Field Procedures

Interviewing was conducted during the period of mid-May to August 1, 1976. Interviewers were instructed to restrict their calls to weekend hours and to late afternoon and evening on weekdays unless it became clear that earlier weekday hours were more appropriate in given households. Interviewers made at least five and as many as nine attempts to contact each household before giving up.

All interviewers were hired, briefed and supervised by West Coast Community Surveys senior staff at the Berkeley office. Interviewers who had never worked for West Coast before were first trained in the basic techniques of interviewing. Before attending the briefing, all interviewers studied written instructions and conducted practice interviews which were reviewed by supervisory staff before they were given their actual field assignments. Interviewers' work was continuously reviewed during the course of field operations, first in small groups and later in private, individual sessions held at least once a week.

At least ten percent of each interviewers' work was verified by telephone and no irregularities were found.

Response Rate

The final overall response rate was 69.2 percent. Overall, rates by stratum varied only from 67.8 percent to 73.2 percent. Rates by site ranged from 61.3 percent to 78.1 percent. Detailed results by strata within sites are provided with sampling rate statistics in Appendix 1.

FOLLOW-UP INVESTIGATIONS

It was the intent of the study to avoid total reliance on the results of the home interview survey. Although extensive and detailed data can be gained from such surveys, any single means of investigation of attitudes and behavior carries with it the danger of undetected omissions or bias as an artifact of the method itself. Surveys are no exception.

Several specific threats to validity were considered. First, the danger of missing whole impact topics was dealt with through use of free-response questions and careful avoidance of "leading" the respondent. Second, potential biases arising from unique personal circumstances were minimized through the random selection process.

A third concern, that of bias arising from undetected site-specific historical effects, led to the use of informal interviews with local newspaper staff and other informed persons to gain historical and social perspectives on the study areas. A fourth concern was the possibility that the respondent might not be conscious of some important yet subtle indicators of behavior in response to impacts; most important was home sales and prices, which was dealt with through a second set of informal interviews conducted in parallel with the first. These were with residential realtors experienced in sales in the study areas, and were intended to complement the survey's items on residential mobility (moving in or out due to BART) and also to suggest the effect of BART, if any, on home sales and prices as an indicator of the system's effective environmental impact.¹

ANALYSIS METHODS

In keeping with the in-depth case study strategy, several complementary methods of analysis were employed. The major portion of the analysis was devoted to the statistical study of the formal survey results. However, as already described, several other types of data and analytic methods

¹More extensive and formal studies of these effects are to be conducted in the BART Impact Program's Land Use and Urban Development Project in 1977-78.

were used to test and extend the results of the statistical study. This use of multiple methods, by reducing the need for total reliance on the formal survey, allowed the use of smaller statistical samples and a correspondingly greater number of case study sites.

Given the small sample sizes within each stratum and site, findings were established using a combination of cross-tabulation table inspection, observation of the sites, and follow-up investigations where feasible. Most of the survey analysis consisted of comparison of the distributions of single variables for two sites or for two strata or respondent groups within a site. Multiple regressions and discriminant analyses using pooled data were also employed.¹

Major steps in the analysis were the following:

- Context: Descriptions of sites, populations and perceived environmental quality.
- Impacts: Descriptions of perceived BART Impacts.
- Causes: Determination of the causes of BART's Impacts.

Methods used in each of these steps are described briefly in the following paragraphs. These descriptive sections are followed by brief explanations of two technical issues -- first, the use of unweighted response data, and second, the study's approach to statistical significance.

Site Description Methods

Direct observation and results of the Phase I impact study were used to describe the physical characteristics of the sites. Population characteristics were drawn from the most recent census tract and block data available. The statistical survey data on respondent characteristics were also used. The survey also provided respondents' ratings of environmental quality and its determinants for their neighborhoods.²

Descriptions of Perceived BART Impacts

The survey variables on BART's general and specific effects yielded data on the frequency and distributions of these perceived effects among the respondents within each site. In addition to the statistical data, listings of impacts volunteered in the survey's free-response questions on impact were reviewed. These results were confirmed by direct on-site observation by study staff.

¹The Statistical Package for the Social Sciences (SPSS) was used in most analyses of the survey data.

²The following chapter presents detailed site descriptions.

Distributions of responses to the survey's perceived-impact items were also compared with the Phase I impact assessments at this stage. These comparisons, for which statistical tests were generally deemed inappropriate, provided an important indication of the accuracy of the Phase I assessments as indicators of perceived impacts.

Causes of Impacts

The primary method used in determination of the causes of impacts was a comparison of impact perceptions between sites. By the appropriate selection of sites for such inter-site comparisons, a potential impact -- either a BART attribute or environmental characteristic -- differed, and other major factors were equated as much as possible. The effects of differences in BART attributes such as line configuration, station traffic and parking, and design amenities were given most attention; variations in environmental characteristics such as housing density and orientation were also considered. Results were confirmed by on-site observation and the informal follow-up interviews.

Use of Unweighted Response Data

The study's complex sampling design resulted in the creation of some 39 subsamples (ten sites with four strata in most). Sampling rates differed substantially, and the final samples were intentionally heavily biased toward strata closest to BART. This bias was consistent for all sites, resulting in approximate proportions of 40, 30, 20 and 10 percent of each site's sample in each stratum progressively more distant from BART.

This large number of subsamples was not appropriate for most analyses and data presentations, both for reasons of relevance and sheer bulk. Each stratum's responses could have been weighted by sampling rates to reflect the total population in each site; however, this would have resulted in the greatest weights being placed on the few respondents who lived farthest from BART and were least likely to have felt its environmental effects. The study's required focus on those most affected would have been lost by this conventional procedure. Consequently unweighted full-site sample data were used, with parallel analyses conducted also on the first-stratum data alone where appropriate.

The result of this compromise of conflicting study aims -- to reflect opinion over the whole site, but to over-represent persons living closer to BART -- means technically that although the aggregated responses are comparable from site to site they do not yield the best estimates of the actual population living within each site. Instead, they indicate the sentiment of a hypothetical population that resides relatively closer to BART than does the actual population at each site. Had a major purpose of this study been to describe a clearly defined population, a different sampling and weighting procedure would have been used. But

for this study, which is principally intended to compare sites and to assess relationships between BART attributes and perceived impacts, this is an efficient design and effective mode of analysis.

The over-representation of persons living less than one block from BART (first stratum) provided sufficient numbers of cases to allow reliable comparisons of these closest-to-BART responses between sites, in addition to the whole-site comparisons. Similar comparisons were also possible between first-stratum responses and those of persons in the remainder of the same site, as a test for the effects of distance. In many of the analyses both first-stratum and whole-site comparisons are reported, thereby indicating both the most intensive levels of impact and the extent of effect on a larger area.

The first-stratum and whole-site responses were found to be generally consistent in valence and weakening in intensity with distance from BART, as expected. For example, interviewers inquired about 24 possible specific BART impacts at each of ten sites, making 240 site-impact combinations.

In comparing first-stratum with whole-site responses, one may define a reversal as any of these 240 combinations in which negative feelings outweighed positive feelings in the one case (say first stratum) but the reverse held true in the other (say whole site). In only seven of the 240 site-impact combinations were such reversals observed, and none of those cases are of sufficient significance to warrant special discussion.

For these reasons, in this report most response data are presented as aggregates over the whole site rather than presenting a separate discussion of those in each stratum. In addition, where important differences were hypothesized or found for the first stratum, they are so reported.

Statistical and Substantive Significance of Findings

With the small samples employed in this study, the role of statistical significance takes on particular importance. In some cases, findings were based on response proportions derived from samples of 20 or even fewer cases, and in such situations there is reasonable cause for concern as to whether site-to-site differences in such proportions are likely to be due merely to chance.

Two lines of defense were employed against this problem. The first of these was to develop statistical guidelines to estimate the differences required between the means of two subsamples for acceptable reliability. This statistical study indicated that differences on the order of about 10 - 20 percent would establish a reliable finding at the ten percent level of statistical significance for full-site samples without prior expectation of the direction of the difference (i.e., a two-tailed test). Only about five to ten percent would be required where testing an a priori

hypothesis as to which site would yield the higher proportion (i.e., of "yes" responses), which was the case in most analyses. The statistical details of this methodological study are presented in Appendix 3.

The second approach was to base as many of the findings as possible on multiple independent pairwise site comparisons, and rely on the achievement of consistent results to strengthen our confidence in their validity. This produces a substantial improvement; as discussed in Appendix 3, even in the very small samples involved in comparisons of first stratum (nearest-BART) responses a difference of about five percent should suffice when two parallel and consistent comparisons are used with directional a priori hypotheses.

Because of the complexity of providing "custom" statistical tests for each of the many specific analyses reported in this study, we rely on these statistical guidelines in the following chapters. This approach provides the necessary assurances of reliable findings, while allowing the use of a relatively large number of small-sample sites stratified for the study's concerns with distance.

Although reasonable assurance of statistically significant response differences is an important criterion, it is not sufficient in a policy-oriented study such as this one. Differences may be statistically significant but still not large enough to be substantively meaningful as a basis for public policy recommendations. This is often the case in large-sample surveys. In this study, however, the sizes of response differences required for statistical significance are also likely to be of practical utility. This demonstrates the efficiency of the design.

Criteria for both substantive and statistical significance were not made more rigid, although fixed criteria could have been established prior to the study. In view of the essentially arbitrary nature of such fixed criteria, particularly in a study as broad as this, their use was deemed unduly limiting. Instead, reliance was placed on knowledgeable interpretation of the results within the general guidelines described above, with careful display of supporting data to allow the reader to verify the interpretations made.

Pooled Multivariate Analysis

While the site comparison method served well throughout most of the study, there was one issue for which it did not allow a full exploration: the effects of personal differences (e.g., demographic characteristics, attitudes) on perceived environmental impacts and general responses to BART. The major methods fell short in this respect for several reasons. Differences in personal variables among sites were often too small to allow for adequate comparisons. Second, such comparisons, when made, ran the risk of "ecological fallacy" (i.e., attributing to individuals the attributes of aggregates). Finally, differences among sites were largely multicollinear; i.e., several personal factors varied over the same site.

Comparisons of personal factors within sites were useful only in a few instances, since the case study areas were fairly homogeneous (e.g., in terms of income, race, age) and did not contain enough variety and large enough samples to allow internal analysis by site. All these considerations pointed to the need for analyses of pooled data and further for multiple regression techniques in order to carefully explore the topic of personal factors related to perceptions of impacts and general satisfaction with BART. Stepwise regression analysis was thus used to test the proposition that demographic factors and attitudes do make a significant difference in responses to BART after accounting for the effects of site and stratum.

The data from all sites were pooled and dummy variables were created for sites and strata. These dummy variables were entered into regression equations prior to an extensive list of demographic factors. In the final step of the analysis, several attitudinal variables were added to the equation. These were entered last in order to control for the effects of factors such as income, life cycle, and race on attitude formation. Two statistics were derived from these stepwise regressions: the percent of the additional variance explained (i.e., after site and stratum) by the demographic variables and then by the attitudinal variables per se; and the significance levels of the F scores for specific personal factors in the final regression equation.

In addition to these regression analyses, stepwise discriminant analyses were conducted on dichotomous (i.e., two category) dependent variables to insure that the results were not affected by the limitations of regression analysis. In no case did these statistical tests yield contradictory findings. In all, the tests imposed upon the hypothesis were very conservative, meaning that any significant personal factors that were discovered are of an important and reliable nature.

A major concern in the pooled analysis was that some site samples were considerably larger than others (i.e., seven sites had samples of approximately fifty respondents, while three sites had samples of about one hundred individuals). This suggested the need for some sort of weighting procedure, or at least a technique that would give confidence that pooled findings were not due to the over-representation of certain sites or site types. Concerns for stratum were bypassed largely for the reasons outlined earlier. Further, the loss of a significant portion of the sample in the outer strata or artificially boosting our sample sizes and thus significance levels through weighting both seemed worse than possibly systematically over-representing BART's impacts.

The method chosen to prevent biases of oversampling by site and site type was sub-group analysis: station respondents and aerial-site respondents were examined separately. Respondents in at-grade sites were removed from this portion of the analysis because of minimal reported impacts. Sub-group analysis was an assurance that the findings from pooled data were not due to the larger number of aerial site respondents (i.e., 315 =

aerial, 249 = station, and 138 = at-grade), assuming that the results on personal factors were similar for both the aerial and station sub-groups. Further, a check against over-representation was achieved within sub-groups: the similar environments of the terminal station sites (N = 146) were fairly well balanced against the El Cerrito site (N = 103); the highly sampled Albany sites (N = 163) were well matched with the three other aerial sites (N = 152); and a similar number of aerial site respondents were facing BART as those having their backyards towards BART. In all, this method seemed best-suited to solving the problem of over-representation, while also providing data on response differences and similarities across site types.

III. CASE STUDY SITES

The present chapter describes the ten case study sites and their residents, and also displays the residents' evaluations of the quality of their environment as indicated by a number of factors not limited to those related to BART. This provides a frame of reference in which the true significance of BART's environmental impacts (reported in the following chapters) can be properly judged. Key statistical descriptors of the sites and survey respondents, as well as respondents' evaluations of their neighborhoods, are provided in Tables III-1 through III-4. The remainder of the chapter describes each site in greater detail.

For these site descriptions, the ten sites are divided into three groups: those adjacent to BART stations, those along its aerial lines, and those with at-grade lines. Data presented include impact assessments made by the study staff,¹ 1970 census block and tract variables, items from the home interview survey and results of the informal interviews with local real estate and print media personnel. Where appropriate, informal on-site observations by the study staff are noted as well. Home interview survey items used include Q1-8 and 31-43 (housing and personal characteristics; evaluations of environmental quality).

STATION SITES

The three sites chosen to represent this category are fairly typical of BART suburban stations. All three stations (El Cerrito, Concord, Daly City) are above-ground and in residential areas. All have user populations which rely heavily upon automobiles to get to the station. Thus, they all have fairly large parking facilities adjacent to the station. The basic environmental impact characteristics they have in common are: traffic related to station attendance, automobile noise, illumination from parking lot lights, and a heavy visual exposure of parking lots and the stations themselves within the residential environment.

The Daly City station differs from the other two in at least one major way: it is at the end of BART's shortest line from downtown San Francisco, and has a large number of commuter patrons who live beyond it on the large peninsula south of San Francisco. As a result, it has the system's heaviest parking overflow problem. Concord is also a terminal station, but is much farther from downtown and so draws patrons from a much smaller commuting population. However, it still has a substantial problem with overflow parking in the surrounding residential neighborhood. These findings suggest a need for improvement of patronage and access mode prediction methods.

The El Cerrito station differs in several relevant ways from the other sites: it is not an "end of the line" station; its patronage is lower;

¹BART and Its Environment: Interim Service Findings, op. cit.; Phase II Addenda to Direct Impacts, op. cit.

Table III-1
SELECTED SURVEY SITE CHARACTERISTICS

	Stations			Aerial Lines					At Grad Lines
	Concord	Daly City	El Cerrito Plaza	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond
BART ATTRIBUTES									
Train headway (min)	6	6	12	12	12	6	6	6	12
1976 Patronage (in + out)	7500	15000	3500	-	-	-	-	-	-
Parking Spaces	1060	820	500	-	-	-	-	-	-
Parking Overflow	100+	1000	-	-	-	-	-	-	-
ENVIRONMENT									
Nearest homes to BART	across street	across street	across street	back yard	across street	across street	across street	back yard	back yard
Adjacent transportation	arterial	art. + fwy	minor art.	art. +1RR	art. + 1 RR	art. (median)	local +2 RR	2 RR	1 RR
Housing type	single	mixed	mixed	single	single	mixed	single	single	s/dup.
Number of units	288	373	288	854	311	307	532	334	564
Home value (\$000)	20	20	22	23	22	20	25	25	17
Average rent (\$/mo)	140	130	135	140	125	100	120	130	90
Upkeep	fair	some poor	good	good	good	fair	good	some poor	fair
POPULATION									
Density (l,m,h)	low	l-m	low	low	low	med	low	low	low
Mean household size	3.1	3.1	2.1	2.2	2.3	2.7	2.4	2.8	3.4
Income class								m-1	
% own home	55	56	37	76	61	49	56	87	61
% Black	0	19	0	3	2	88	1	0	90
% Span. Lang. or Sur.	6	24	6	7	9	4	15	15	5
% 18 and under	32	34	16	21	20	28	21	22	40
% 62 and over	10	10	22	26	24	15	20	16	5

Source: 1970 U.S. Census block and tract data; late 1975 BART data; and direct site inspection.

Table III-2

SELECTED POPULATION AND HOUSING CHARACTERISTICS OF SURVEY RESPONDENTS

	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
White (% of response)	93	54	80	86	91	14	96	94	10	82
Married (%)	64	52	53	60	64	35	57	82	52	76
Homeowners (%)	59	68	61	73	71	49	49	92	67	96
Single-family home (%)	100	86	74	91	84	53	72	100	81	100
Rated "very Good" Housing by Interviewer (%)	44	4	62	50	42	39	37	54	24	52
Mean Education Index ¹	3.0	3.0	3.3	3.8	3.2	2.8	2.8	3.2	2.7	2.7
Mean Income Index ²	3.8	4.0	4.3	4.4	3.7	3.1	3.3	4.7	3.2	4.4
Mean Years of Residence	8	10.7	9.3	12	14.2	10.6	9.8	14.5	10.3	13.8
Median Age, Years	33	38	49	49	57	49	51	55	38	47
"Regular" BART Users (%)	20	51	31	12	8	12	7	13	17	6
Number of Respondents	(96)	(50)	(103)	(118)	(48)	(52)	(51)	(49)	(88)	(50)

¹From ordinal-scaled categorical data: 1 = 8th grade or less, 3 = high school graduate, 5 = college graduate, etc. (See Q34, p. 24, Appendix 2)

²From ordinal-scaled categorical data: 1 = less than \$4,000, 3 = \$7,000-9,999, 5 = \$15,000-19,999, etc. (See Q42, p. 26, Appendix 2)

Table III-3
RESPONDENTS' OVERALL RATINGS OF ENVIRONMENTAL QUALITY

Frequency of response, by Percent of Respondents										
Stations			Aerial Lines						At Grade Lines	
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.	
<u>Q2. "Pleasant location"</u>										
Very Pleasant	41	50	76	65	62	44	43	63	38	56
Pleasant	42	36	22	30	31	37	35	18	43	36
Neither	2	6	0	1	4	2	0	2	5	2
Unpleasant	9	6	2	3	2	15	16	14	11	6
Very Unpleasant	6	2	0	2	0	2	6	2	1	0
<u>Q3. "Best location"</u>										
Much Better than Most	31	37	47	47	36	19	24	48	21	32
Better	26	20	31	34	46	39	35	33	34	34
Same	33	35	21	16	16	42	37	19	38	34
Worse	11	6	1	3	2	0	2	0	7	0
Much Worse	0	2	0	0	0	0	2	0	0	0
<u>Q8A. "Has neighborhood changed"</u>										
Yes, For Better	32	38	25	22	29	31	20	35	32	20
No, Stayed Same	38	34	67	65	56	44	53	45	48	60
Yes, For Worse	30	28	9	13	15	25	28	20	21	20
<u>Number of Respondents</u>	(96)	(50)	(103)	(118)	(45)	(52)	(51)	(49)	(88)	(50)

	Dissatisfaction Index*									
	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
...the people who live right around here (within a block or two)...	1.8	1.7	1.5	1.4	1.5	1.7	1.7	1.3	1.7	1.6
...the parks or playgrounds nearby...	2.2	2.1	1.8	1.6	1.8	2.5	2.1	1.9	1.8	2.0
...trees and other natural features...	1.8	2.5	1.8	2.0	2.3	2.7	2.1	1.5	2.1	2.1
...parking for people who live around...	4.1	4.3	1.9	2.0	2.2	2.4	3.0	1.8	2.4	2.4
...the children and teenagers you see around here...	2.2	2.3	1.8	1.8	1.8	2.3	2.1	1.8	2.3	2.0
...the quality of schools around here...	1.9	2.1	1.7	1.8	1.4	2.2	2.0	1.9	2.0	2.1
...safety from crime...	2.3	2.4	1.7	1.8	2.0	2.3	2.2	1.6	2.6	2.2
...the number of large vehicles like trucks and buses going past here...	2.6	2.4	2.0	1.7	2.1	1.9	1.7	1.6	2.1	1.8
...traffic in general around here...	3.4	3.1	2.2	2.0	2.7	2.2	2.4	2.6	2.3	2.3
...the general appearance of most homes around here...	2.5	2.6	1.6	1.6	1.8	1.9	1.8	1.5	2.0	2.1
...the bus service...	1.8	2.3	1.4	1.6	1.7	1.6	2.1	2.1	2.4	1.9
...privacy in your home (and yard)...	2.1	1.6	1.4	1.5	1.4	1.7	1.8	1.5	1.8	1.6
...BART service...	1.8	1.6	1.5	2.6	2.5	2.2	2.1	1.7	2.3	1.7
...having the BART line nearby...	2.0	1.7	1.4	2.9	3.6	2.2	3.1	2.4	2.3	1.7
...the way the streets and sidewalks are kept...	2.5	2.6	1.5	1.7	1.5	2.1	3.0	1.5	2.5	2.0
...the amount of construction work around here...	1.8	1.8	1.5	1.6	1.9	1.7	1.5	1.2	2.2	1.7
...air quality or smell...	1.9	2.0	1.6	1.7	1.8	1.8	1.7	2.0	1.9	1.9
...convenience of nearby shopping...	1.3	1.7	1.1	1.2	1.3	2.1	1.9	1.1	2.1	1.4

* Data in table presented as means of categorical responses, where 1=very good for respondent, 2=fairly good, 3=half and half, 4=fairly bad, and 5=very bad.

despite a smaller parking lot, it has no parking problems; and it is located next to a subregional shopping center which itself has a large parking lot and creates heavy traffic flow.

In the following paragraphs each of these sites is described in greater detail. Included in this description are the site's impacts attributed to BART by the study's technical assessment; the physical and social characteristics of the site, as recorded by census, survey, or judged by the study staff in informal observations; and the residents' perceptions of environmental quality and its key components, as recorded in the interview survey.

Concord

Some of BART's impacts at this station were assessed as adverse in the Phase I technical impact study. These adverse impacts included over-flow parking, danger of traffic accidents, disruptive visual contrast, and local traffic interference. Although these problems were judged in Phase I to be more severe at Concord than at most other station sites, they were not felt to be as bad as at Daly City.





AERIAL VIEW
OF CONCORD
STATION SITE
(looking
northwest)

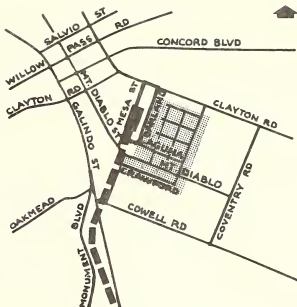


The surveyed residents of this area are predominantly white (93 percent), fairly young in age (median = 33 years) and fairly low in length of residence (mean = eight years). Examinations of the income and educational characteristics of the respondents would place them in the lower middle income bracket (i.e., average around high school education and under \$10,000 per year). About two-thirds of the respondents are married, and indications from census data suggest that a good number of children are present in this area (32 percent are under 12 years) as well as a small number of elderly (ten percent are over 64 years).

Figure III-1
MAP OF CONCORD
STATION SITE

Legend

-  BART Parking Lot
-  BART Station
-  BART Line
-  Study Site



Using both census statistics and the survey respondent data, it becomes obvious that while all homes in this area are separate single-family dwellings, only a little over a majority (55 - 60 percent) are owner occupied. Housing quality in this relatively low density area is uneven: some are well kept, while others appear to be in early stages of deterioration. As assessed by the interviewers, most respondents' (52 percent) housing quality is "average", except in the part of the site farthest from BART; there the housing was assessed as newer and better kept. In general, this area appeared to an observer to be in transition: it attracts a good number of moderate income, younger people seeking lower rent or single family dwellings, while long term residents are also present -- older homeowners keenly interested in maintaining the quality of their property.

We recognized the importance of determining how people perceived their residential area and BART's influence, in order to determine whether local sentiment believed BART to have some impact on this deterioration. Overall, this area is not rated as highly by its residents as are some of the other sites: 41 percent agreed that the location is "very pleasant" while about a third considered it among the best locations in the Bay Area. Condition of housing, as perceived by the respondent, is among the worst we sampled, with only 12 percent reporting "very good" conditions and about a quarter with at least "bad" conditions. However, the most serious problems in this site seem related to the BART station's impacts as assessed earlier in the study: 78 percent of all respondents rated "parking in the neighborhood" as "bad" or "very bad", and 55 percent rated "traffic in the neighborhood" similarly. There is also some displeasure with the way sidewalks and streets are kept (30 percent "bad" or "very bad"), which may also reflect trash problems around the BART station.

Clearly, the aspects of the neighborhood disliked the most are BART-related: traffic and parking. Only "convenient shopping" was indicated frequently

As a positive aspect of the area; a small shopping area borders the study site. Despite BART's adverse local impacts, respondents do not seem overly harsh in their assessments of BART service (57 per cent "very good"). About one-fifth of the respondents said they were regular BART users. More important, residents were generally positive about having BART nearby (55 per cent "very good"). Apparently, the increased accessibility of a nearby station dampened the adverse feelings toward the system's overall environmental effects.

The study sample is about evenly split among people who thought the neighborhood had gotten better, gotten worse, or remained the same during their residence there (since BART was built). The most common reasons they cited for "change" observed in the neighborhood were BART and the quality of neighbors; however, BART was more often seen as making the neighborhood worse, while the new neighbors more often were seen as making it better. However, our talks with local realtors indicated that BART had not had enough effect to alter housing sales prices.

Daly City

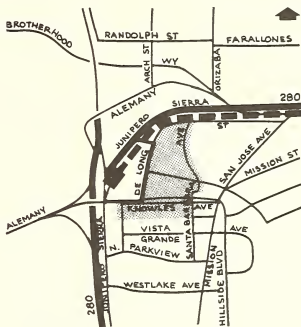
This station is of special interest as a model for what impacts might be expected at the terminus of a short "starter segment." According to the study staff's Phase I impact assessments, this site is one of the worst impacted station areas in the BART system. It is the only station on the entire Daly City line with a parking lot. Since the BART clientele at Daly City includes large numbers of commuters who drive to the station from the San Francisco peninsula, this station has serious automobile-related problems. In addition to peak-period traffic congestion around the station, there is an extreme parking shortage. This has resulted in as many as 1,000 cars parking on the residential streets around the station.



AERIAL VIEW
OF DALY CITY
STATION SITE
(looking
northeast)

The station's 800-car parking lot is now being expanded to a capacity of 1,500 cars with the construction of the system's only multi-story parking structure. At the time of the survey this structure was not yet completed. In any case, it is not clear that the added capacity will eliminate the problems; the easier parking may well encourage more use of cars to get to the station.

Figure III-2
MAP OF DALY CITY
STATION SITE



Housing and population characteristics of this area indicate that it is one of the more "urban" neighborhoods sampled. It is a moderate density area and racially heterogeneous (54 percent white, 20 percent Black, 26 percent other). These residents are slightly more affluent and educated, on the average, than the Concord site's residents. Census data indicate that about one-third of the area's residents are under 18, and about ten percent are 65 or older. Examination of age and length of residence indicate an older and somewhat more stable populace than in Concord, and one of the highest average populations per household (3.1).

About two-thirds of our respondents are homeowners (1970 census figures report 56 percent). While the neighborhood is predominantly single-family homes, there is some mix in land use and very closely spaced housing in this hilly area. Housing appears to be slightly run down, and interviewers rated only four percent of the housing as "very good" in quality (poor: 12 percent; average: 84 percent). A visitor to the neighborhood would be aware of two additional attributes: the close location of this area to a major thoroughfare and freeway (29 percent of the respondents could see the freeway; 65 percent could see other busy streets), and the large number of "no parking" signs in residents' driveways. The latter is of obvious relevance to BART's impacts.

Residents of this area rated their neighborhood, overall, in slightly more favorable terms than did those in Concord. Several aspects of this area were rated unfavorably, though most noticeably two that were BART-related: parking (62 percent "very bad") and traffic (24 percent "bad" or "very bad"). While parking problems seemed more severe here than in Concord, traffic was seen as less of a problem. The quality of housing and landscaping (natural areas, parks, streets and sidewalks) were also given low marks. Possibly of interest to our concern with BART's impact, safety from crime was seen as a problem by about one-third of the respondents.

BART, however, was seen as a good aspect of the area: in fact, its best. BART service was rated as "very good" by two-thirds of the respondents, and having BART nearby was rated as being a "very good" aspect of the neighborhood by three-fourths of the sample. In short, BART and its attributes seemed to make up the very best and the very worst aspects of this residential area. This could have been influenced somewhat by the fact that 50 percent of the respondents, the highest at any site, reported themselves regular users of BART.

ON-STREET
PARKING AT
DALY CITY
STATION
(looking
north-east
across
DeLong)



Again, about equal percentages of people saw positive, negative or no changes in the neighborhood environment since they had moved there. "BART" and "neighbors" were the most commonly mentioned reasons for change. However, those who perceived change were not unified in assessing whether these two reasons altered the neighborhood for the better or worse: perhaps because BART, at least, did both.

El Cerrito Plaza

This is a station which, from the study's earlier findings, seems to have a minimum of adverse impacts for a number of reasons. First, it is not a terminal station, and does not have a large number of automobiles feeding into it from a large area. It has a fairly small patronage, small parking lot, and low traffic volume; all would point to a lessening of harmful impacts to the residential area. Moreover, it was built adjacent to an already existing major shopping center, so traffic and parking impacts (the two worst station problems) were already a part of the local scene and related adjustments had already taken place.

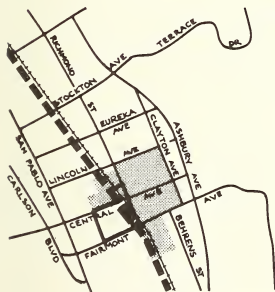


Figure III-3
MAP OF EL CERRITO
PLAZA STATION SITE

AERIAL VIEW OF
EL CERRITO
PLAZA STATION
SITE (looking
east)



This site's population is predominantly white (80 per cent), and many are fairly new residents (40 per cent under four years). The median age is higher than average (49 years), with a small percentage of children (16 per cent) and a somewhat larger number of elderly (22 per cent). Our respondents in this area were among the more educated and more affluent in our total subject pool. About 60 percent of our respondents were homeowners (1970 census data: 40 percent homeowners) and about three-quarters of the sampled dwellings were single-family homes. Interspersed through the site (particularly on the west side of BART) are fairly new and high quality small apartment buildings mixed into blocks with single-family homes; this probably accounts for the lower than anticipated length of residence and the fact that only 53 percent are married.

Housing quality, as rated by interviewers, was higher in this site than anywhere else, with 62 percent of the dwellings rated as "very good".

This site was ranked higher in environmental quality, overall, than any other station site or any other non-station site. It had all the benefits of being near BART with a minimum of the costs. For example, only about one in six people complained about parking, and more than 75 percent of the people saw no major traffic problems in their neighborhood. Only two percent of the sample (i.e., two people) found their residence an unpleasant place to live, and almost 80 percent thought it was one of the best locations in the Bay Area. All aspects of the neighborhoods' physical and social environment were uniformly rated high (e.g., safety, housing, neighbors, streets and walks, privacy -- mean responses between "very good" and "fairly good"). Among the highest rated traits were convenience and transportation facilities (i.e., bus service and BART): 96 percent of the respondents thought that the neighborhood was "good" or better for convenience and bus service. BART had similar high marks: 95 percent of the people were positive about BART's local presence, and 92 percent were pleased with BART service (31 percent of the respondents were regular BART users).

The large majority (67 percent) of respondents reported "no change" in the character of the area during their residence there, and only 9 percent regarded the change to be for the worse. As with the other station sites, those who did perceive change found neighbors and BART as primary reasons. BART (and, possibly related, property values) were seen largely as changes for the "better" in this neighborhood, as were neighbors (changes for the worse were few and scattered).

AT-GRADE LINE SITES

Our two sites (Richmond, Hayward South) are fairly typical in their BART-related environmental characteristics. BART is at ground level at these sites rather than elevated, which we expected would eliminate, or at least greatly reduce, several of the problems associated with aerial lines (e.g., view of the structure, noise, and vibration). In addition, both at-grade

sites occur in already existing railroad rights-of-way. This suggests background activities potentially masking BART's adverse impacts. However, BART's at-grade portions all have a problem not associated with aerial sites -- namely, large right-of-way land requirements. In addition, because safety precautions preclude travel across the tracks, the at-grade configuration may cause BART to become a substantial barrier in the community.

The Richmond and Hayward South sites differ most markedly in their BART attributes in the latter respect. The Richmond site has a residential area mainly on one side of the track (the other side is commercial), while Hayward South has residences on both sides of the tracks and a school on one side. They thus have different degrees of potential access problems. They differ in one other major environmental respect: frequency of BART trains. The Richmond line, still not operating at planned capacity, has approximately half the number of BART runs (one-way headways averaging 12 minutes) as the Fremont line (i.e., at the Hayward site) which is fully operational with headways of six minutes.

Richmond

This residential area is situated between the Richmond and El Cerrito del Norte stations in a predominantly Black area with small single-family homes and some non-residential areas nearby. The BART tracks here parallel the same nearly-abandoned single railroad track as in the Albany sites, and the site's nearest houses back up to the tracks. Based on the Phase I studies, the most serious problems, if any, would seem to be decreased access across the tracks, as well as BART train noise and view. However, even these should be minimal since BART construction included a pedestrian bridge across the tracks here and noise and view problems were judged in Phase I to be much smaller than in aerial line sites.

This area is about 90 percent Black according to both census and respondent data. The population tends to be fairly young: the median age is about 38 for our respondents, with 40 percent children and five percent elderly in the site according to census data. The average length of residence indicates a community about as stable as the Oakland and Daly City sites. Combined education and income scores indicated that this was one of the most disadvantaged areas that we investigated.

Homes were predominantly single-family (81 percent), one-story dwellings (78 percent). About two-thirds of the respondents were homeowners (62 percent by census data figures) and about half the sample was married. Housing conditions were not given a high rating by the interviewers, with 18 percent of the respondents living in "poor" housing and only 24 percent living in "very good" housing. The quality of the residential environment can be best described as mixed or uneven in nature.

AERIAL VIEW OF
RICHMOND SITE
(looking north)

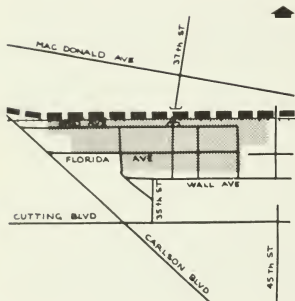


Figure iii-4
MAP OF RICHMOND
AT-GRADE LINE SITE

The residents of this area rated the neighborhood overall, and its specific attributes, in critical terms. They were unhappy with their location, as compared to others in the Bay Area. They complained more than other groups about issues related to convenience and transit services. They were more concerned with crime than were respondents at any other site we studied. In short, they were uniformly and highly dissatisfied with the quality of their neighborhood except for one attribute: the availability of parks nearby. The park in question is across the BART (and railroad) tracks.

The availability of BART, of course, did not help these people since a station was not nearby. About a quarter of the residents had complaints about BART service, and most did not consider BART either a positive or negative addition to the area. Their complaints about BART service and transit facilities could be due to the frustrations of individuals living in an area relatively inaccessible to mass transit who see and hear a transit service which does them little good. Seventeen percent of the respondents were BART users and many of them could also be voicing dissatisfaction with distance to BART stations and less frequent service on the Richmond line.

About a third of the respondents thought that the neighborhood had improved in recent years, while 20 percent saw deterioration and about half perceived no change at all. There was no consensus on the causes of change; while neighbors, children, and crime (in that order) were most frequently mentioned, half the people thought these factors had improved in the area, while the rest thought they had worsened. Only a few of these people saw BART as a factor in either favorable or unfavorable neighborhood change, and all these respondents saw it as a good factor for the area.

Hayward South

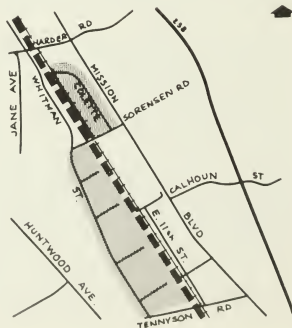
This site was between the Hayward and Hayward South stations, with the BART tracks next to main-line railroad tracks in a fairly wide right-of-way. The site included homes on both sides of BART. BART seemed somewhat closer to respondents on the east side of the track than on the west side; it was fairly distant (50 - 100 feet) from the backyards of houses on both sides. Noise, visual intrusion and vibration from BART seemed minimal to the observer in this single-family home area already accustomed to a mainline railroad. BART's most serious disruption would again seem to be access, with BART's fencing making travel between the east and west side of the track less convenient (although a BART-built overhead crosswalk joined these areas). With a school on the west side and a commercial district on the east, inconvenient access seemed a potential problem.

Members of this community are predominantly white, with some Mexican-Americans. There was no noticeable Black population (respondent characteristics: 82 percent Anglo, eight percent Mexican-American, no Black). The neighborhood seems to include predominantly older families, with about three-quarters of our respondents married, 47 years as a median age, and a rather high average length of residence (14 years). Also the average number of persons per household was among the highest of the sites we studied (3.0). Census data indicated a high percentage of children (40 percent) and a low percentage of elderly (eight percent) in this area. Incomes were among the highest of all the sites, while education was equivalent to that at some of the poorer sites. This indicates, as in Hayward North, a predominance of blue collar, skilled workers.



COMPOSITE AERIAL VIEW OF HAYWARD-SOUTH SITE
 (SHOWING THE SECTIONS OF THE SITE ON BOTH
 SIDES OF THE BART TRACKS, looking east)

Figure III-5
 MAP OF HAYWARD-
 SOUTH SITE



VIEW OF
BACKYARDS
FACING BART
AT HAYWARD-
SOUTH SIDE
(looking south)



Almost every respondent sampled was a homeowner and almost every home in this neighborhood was a single-family, owned dwelling (by census and respondent data). The interviewer rated half of the homes seen as "very good" in quality, and the rest as average (there were no "poors"). From an observer's standpoint, the area was uniformly well kept.

Overall, this area was rated as a pleasant place by its residents, with only a few finding the neighborhood bad or unpleasant. Yet no aspects of the residential environment were described as especially good or especially bad. Among the highest rated factors were the quality of neighbors and the degree of privacy in the home. The most serious drawbacks reported were parking, traffic, and crime problems. These factors seem more related to impacts of facilities and services in the neighborhood (e.g., the school) than the BART tracks per se.

BART was given high praise as part of this residential area. Some 90 percent of the respondents rated BART service and the availability of BART nearby as "good" or "very good" factors. This was unexpected, since only six percent of the respondents were regular BART users and one out of every three had never even ridden BART. As a general feature of their environment, rather than something of direct utility to them, they apparently felt the closeness of BART to be a good thing. Sixty percent of the sample saw no recent changes in the quality of the area, while the rest of the sample was evenly split between those seeing trends for the better or worse. "Children" and "neighbors" were again the most cited causes, while BART was mentioned by only two people (in all these cases, there was no consensus over these factors leading to improvements or deteriorations in the local situation). In any event, as with other measured aspects of environmental quality in Hayward South, in the minds of these respondents BART is overshadowed by other factors in a general assessment of this area.

AERIAL LINE SITES

Five of the study's ten sites are in this category, because of the expected significance of aerial lines in causing perceptible impact and also because of the diversity of conditions found in the residential areas along BART's aerial trackways.

The five sites that we chose -- Albany (two sites), Oakland, San Leandro, and Hayward North -- together represent a broad range of conditions typically found systemwide along BART's aerial lines within residential areas. These are characterized by a relatively narrow right-of-way; a lack of barriers, permitting easy access for automobiles across the BART tracks; a heavy visual exposure of trains and of the aerial structure, with consequent shadows; and problems related to the train traffic, such as noise, vibrations, wind, and television reception. All of these latter problems are apparently aggravated by the aerial structure.

The study's Phase I findings also indicated that the level of impact created by the aerial structure depends upon the environmental context in which it is found. Our selection of aerial sites and of respondents within sites gave special weight to that viewpoint. For example, in Albany the BART aerial line was built with a "linear park" (a landscaped right-of-way) surrounding it, which we felt might offset adverse impacts of the aerial structure. In the Oakland site, BART is set above the middle of a busy street, with substantial traffic noise. In contrast, the two southern sites, San Leandro and Hayward North, have no linear parks. Like Albany but unlike Oakland, they are relatively quiet, low-density residential areas. Further, individuals living in Stratum 1 in all of these sites are extremely close to the BART structure. Thus, train effects and the structure's visual characteristics should be particularly acute for them.

Albany

We selected two separate "sites" at this location which lies between the North Berkeley and El Cerrito Plaza stations. BART runs closest to the houses on the east side; the backyards of these dwellings face BART and private fences separate their property from the BART linear park and an adjacent (nearly unused) single railroad track. On the west, which is technically a separate site in this study, houses across a street face BART and the linear park.

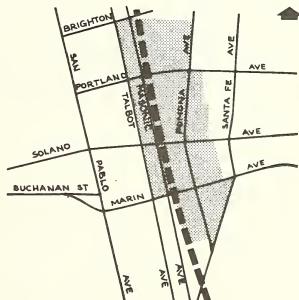
Both Albany sites should be affected by BART's train noise and vibrations, and visual intrusion of the structure itself and BART trains. However, since the west side site is farther from BART and has the benefit of the park view as well as undisturbed backyards, it was anticipated that these factors might alleviate some of the impacts in contrast to those which residents in the east side site might experience.



AERIAL VIEW
OF ALBANY AERIAL
LINE SITES

About 90 percent of this area's residents are white, based on both respondent and census data. Age and length of residence characteristics of these subsites indicate an older, more stable population (about 60 percent married) than at most other sites, and census data indicate that approximately one-quarter of the residents are elderly. Education and income levels are among the highest in our study, particularly on the east side of the aerial structure. The area is composed of predominantly single-family dwellings (more than 85 percent), with about 70 percent of our respondents being homeowners (corroborated by 1970 census data).

Figure III-6
MAP OF ALBANY SITES



Housing quality was rated mostly as "very good" on the east side and "average" on the west side of this Albany area, with very few poorly maintained houses reported in either site. In all, housing appears to be very well maintained, although the stock was somewhat small and old in nature, and not of high value. There do appear differences between the residential area facing the park (west) and that which faces away from it (east), with the latter in somewhat better overall condition.

Residents of both sites in the Albany location rated their area very highly. Five percent or fewer judged their neighborhoods unfavorably (in terms of "pleasant" and "best" locations). On separate attributes, residents also reported a good number of positive feelings about their residential areas. Among the most favorable characteristics were convenience for shopping, neighbors, and home privacy. Residents of the west site regarded several attributes of their neighborhood more negatively -- particularly parking, landscape features (despite their access to the linear park) and traffic problems. These complaints are probably associated with the wide (although lightly traveled) street between them and the BART structure.



ALBANY LINEAR
PARK

Respondents in both Albany sites are unified and strong in their complaints about BART's place in the locale. These were the worst complaints made about any environmental feature in this Albany neighborhood. In fact, the quality of BART service and the fact that BART was nearby was rated lower here than in any other site. Fewer than 30 percent of the respondents considered service to be "very good" and fewer than 20 percent found "BART nearby" to be a very good attribute of the area. To make matters worse, BART use was low here -- around ten percent -- which meant that utilization of BART by respondents would not offset its perceived adverse neighborhood impact.

Despite these indications of discontent, the respondents in both areas expressed very little belief that "change" was occurring. Changes "for the worse" were, particularly in view of the observed negative impacts, surprisingly low (approximately 15 per cent). The east (non-park) site residents reported greater stability (about two-thirds "remains the same"), indicating that more positive change was occurring on the linear park (west) side of the Albany site (about 30 per cent "better"). "Neighbors" were again a major factor cited for changes, as in other sites. Considering the historically strong sentiment against BART in this area (which was corroborated by local newsmen), the transit system was seen as causing surprisingly little disequilibrium in the community. In fact, in the east site, BART is not seen as a significant factor in change at all. This was supported by our informal interviews with local realtors, who indicated that BART has had no noticeable effect on home sales prices near the aerial line there.

We tentatively account for these surprising results by suggesting that the residents, though reluctant to admit its positive features in a community where there has been widespread discussion of its drawbacks, tacitly acknowledge that the presence of BART does bring some offsetting advantages. On the side facing the linear park, both positive and negative changes were related to BART, perhaps indicating an appreciation for the addition of the linear park, though also a continuing sensitivity toward the aerial line impacts. These early findings tend to contradict expectations from Phase I; they indicate that linear parks do not subtract from the adverse effects of aerial structures, and suggest instead that they are evaluated as a separate, positive entity. (This will be discussed further in a later chapter.) In all, though, for a population which seemed so strong in its conviction of BART's negative effects on the neighborhood, residents interviewed did not seem to perceive BART as an important cause of change in the neighborhood.

Oakland-Grove Street

In this area, BART's aerial structure is in the median strip of busy, noisy Grove Street, an important traffic artery. We therefore expected BART's potentially adverse impacts (noise, vibrations, visual contrast) to be minimized by the effects of this "background" traffic activity. However, the site includes a good number of two and three-story apartment buildings, as well as a slight rising slope to the east of the BART line, perhaps making BART's noise and its structural aspects more prominent.

The respondents in the area in question are predominantly (80 per cent) Black; by 1970 census standards the area is even more so (88 per cent). Fewer married people live in this area than in other sites, with, instead, a high number of both single and once-married individuals. Data on the age characteristics of residents indicate a fairly good mix, with respondents' median age around 49, and a considerable percentage of both elderly (15 per cent) and young (28 per cent under the age of 16). Length of residence data indicate a fairly stable population, in the range of other relatively "urban" sites (Daly City and Richmond). Considering income and education together, this area contains our most disadvantaged respondents.

Figure III-7
MAP OF OAKLAND
AERIAL LINE SITE



As could be expected from the socio-economic and life cycle descriptions, the Oakland site has the lowest percentage (53 percent) of single-family dwellings and homeowners (49 percent), with about 22 percent of the respondents living in apartments (1970 census data: 49 percent homeowners). Housing quality is among the lowest at most sites, with only 39 percent of dwellings reported in "very good" condition by interviewers. However, only eight percent were judged to be in "poor" condition. Firsthand observation showed this site to be one of older buildings, but, while somewhat uneven in upkeep, the housing did not seem severely deteriorated. At the same time, although this is by no means a tenement slum, housing quality is about as poor as is found anywhere along BART.



VIEW OF AERIAL
LINE AND
OAKLAND SITE
(looking east)

Overall ratings of the neighborhood by its residents, predictably, are not as high as in most other sites. Somewhat fewer than one in five interviewed found it to be one of the best locations to live in, while about the same ratio found the environment unpleasant. Complaints about the locale were numerous, and not unusual for an inner-city area: bad landscaping and park facilities; traffic and parking; crime; schools and children. In addition, this area does not possess the most common urban benefit, "convenience of shopping." However, bus service is rated very high in this area, being its most favorable attribute. BART is given a rather lukewarm rating: its contribution as a neighborhood attribute (both in terms of "service" and the impact of its being "nearby") places it midway between the very good and the very bad factors operating in this area. Only about one-third of the people rank BART's presence and activities very high and only 12 percent of the respondents are regular BART users.

A good number of respondents perceive change occurring in this area; slightly more see the change to be for the better than for the worse (31 percent versus 25 percent). Neighbors and children are the key causal factors cited in this change, with no consensus on which factors caused beneficial or harmful alterations. BART's role seems to be small and inconsistent; only a handful of people cite BART-related factors, and these are equally divided for the better and worse. In all, the residents of this area, who experience great economic disadvantage, do not seem to find BART to be a key factor in their evaluations of environmental quality. BART is apparently overshadowed by other more pressing concerns with the locale.

San Leandro

This site is situated in a primarily quiet, residential area, bounded on one side by a heavily used commercial district and on another by a subregional shopping center (Bayfair) similar in size to El Cerrito Plaza. The houses on the edge of this district back up to BART, which is situated to the west of the site in a fairly narrow, undeveloped right-of-way. A double main-line railroad track, unfenced and at-grade, is beyond BART. Since the high aerial structure virtually towers over these homes, with little distance or background activity to moderate BART's effects, we would expect substantial environmental impacts of the typical aerial line nature: noise, vibrations, shadows, interference with television reception and visual intrusion. No environmental attributes of this area seem capable of absorbing these adverse stimuli.

Almost all of the respondents in this area were white (94 percent). The representativeness of this sample is confirmed by available census data, which reported no Blacks living in this area. The sample in San Leandro was somewhat older than elsewhere (median age = 55) though not of elderly status (under 18 = 22 percent; elderly = 16 percent by census data). In terms of length of residence, this was the most stable area we studied, and a large majority of those sampled were married (82

percent). This area was ahead of others in income, though it lagged behind in education, probably indicating an older, skilled blue collar population. Ninety-two percent of the respondents sampled were homeowners (87 percent by census data) and every home sampled was a single-family, one-story dwelling. Housing condition was generally excellent, with no interviewer reporting housing in poor condition, and a majority of homes were rated as "very good" in quality. From firsthand observation, the neighborhood appeared modest but well kept, with housing of generally moderate age (early 1950s).



Figure III-8
MAP OF SAN LEANDRO
AERIAL LINE SITE

VIEW OF AERIAL
LINE FROM SAN
LEANDRO SITE
(looking west)



Most people rated this area as a nice place to live. About two-thirds of the sample found their neighborhoods to be "very pleasant" and most found it to be a very good location. On individual attributes, the area rated extraordinarily high in comparison with the responses from other sites. It was considered extremely convenient, yet had pleasant social features (neighbors) and environmental characteristics (streets, housing conditions, landscape, privacy). Crime did not appear to cause much complaint in this locale, in contrast to others such as Oakland. The most displeasing aspects of this environment are mostly transportation-related: air quality, traffic, BART, and bus service. The latter was especially poorly rated. While BART service was rated fairly high, its presence nearby elicited negative comments from about one-fourth of the respondents. Few (13 percent) of those sampled were BART users. Thus residents of this pleasant neighborhood, unlike Oakland-Grove Street, did notice the presence of BART.

Over half of the people in this San Leandro site noticed change in the neighborhood, and by almost two to one they saw the neighborhood improving in character. Children and neighbors were the main source of this change for the better, while crime was reported by a few as a reason for a change for the worse. BART played a generally insignificant role in these responses, and when mentioned it was predominantly in a positive way. Surprisingly for a site with seemingly detrimental BART attributes and neighborhood characteristics worthy of loud defense, there was only mild anti-BART sentiment regarding its effect on environmental quality. In such a context, these responses suggest that the aerial BART configuration fits quite well.

Hayward North

The aerial BART track is to the west of this study site, across a narrow street in a narrow right-of-way. A main-line double railroad track is farther to the west. The site's homes along the BART line face the aerial structure and seem dwarfed by its very close, high presence. The area is quiet and residential. Based on the study staff's impact assessments, this Hayward site would seem to be particularly vulnerable to the following kinds of BART impacts: noise, vibrations, impaired television reception, shadows on front yards, and visual dominance of the aerial structure and BART trains from the front of homes. It was anticipated that substantial BART impacts would be reported by respondents.

This neighborhood is virtually all white (96 percent or more by census and respondent data), with a mix of elderly (18 percent by census), children (28 percent census) and middle-aged people (median age of 51; toward the upper end among our sample of sites). Education and income characteristics of respondents indicated a group socio-economically on a par with the Oakland site: largely falling into the disadvantaged class. Average length of residence was low for such an old area, and there appeared to be a good mix of married (57 percent) and unmarried individuals. Both census (41 percent) and respondent (49 percent) data

Indicated slightly fewer homeowners than renters in the area, though most dwellings were single unit. Housing quality as assessed by interviewers was average, with only slightly more than a third of the homes being "very good" in condition. To the observer, the area seems old, with a mix of suburban and rural-looking blocks. Although there are suggestions of a slow deterioration of the housing, residents appear to be attempting to care for their property.

Figure III-9
MAP OF HAYWARD-
NORTH AERIAL LINE
SITE



VIEW OF AERIAL
LINE FROM
HAYWARD-NORTH
SITE (looking
northwest)

Overall ratings of the area by respondents were lower than in most other study sites: 22 percent considered their neighborhood "unpleasant", and 24 percent reported it to be "much better" than other locations. Individual neighborhood attributes fared no better. Some of the worst complaints involved streets and walks, parking, and traffic. The best aspects of the area involved the quality of neighbors, and minimal personal disruptions from the environment (e.g., privacy, no large vehicles, and no construction). In general, other items were rated lower than at most sites. BART was not given good scores by respondents: its service received a (comparatively) mediocre rating, and the fact that it was "nearby" elicited the most negative response (44 percent "bad") of any attribute of the neighborhood. Few respondents (eight percent) were BART users.

At this site, in short, BART appeared to be a very unfavorable attribute in an area perceived by residents in relatively negative terms. About half the respondents noted change, with the majority seeing a turn for the worse. The most common causes were "neighbors" and "crime". The former was seen by respondents in both positive and negative ways, while the latter was more readily agreed upon as a worsening neighborhood situation. BART was not mentioned enough to play a significant role in the discussion of neighborhood change, though the few times it was mentioned were always in reference to "worsening" the area. In all, the Hayward North site appears to have many problems as a neighborhood, with BART apparently contributing noticeably and negatively to the overall situation.

IV. GENERAL RESPONSES TO BART

The previous chapter displayed the characteristics of each of the study sites and the residents' ratings of the quality of their neighborhoods with respect to a variety of environmental factors, including BART's presence. These findings indicate the perceived importance of BART's impact relative to other forces, and thereby provide a useful frame of reference for the interpretation of the study's more BART-specific inquiries.

This chapter now presents the results of the most general of those further inquiries. This overall response to BART is generally favorable. In seven of the ten sites the proportion of respondents "happy" to those "unhappy" with BART overall was two to one or higher. Even in the worst case 49 percent of the site's respondents were happy, with 31 percent unhappy. These and other aspects of the general response to BART will be presented in this chapter in greater detail. Findings from the survey will be discussed separately for each site, in keeping with the sample design.

In addition to discussion of overall feelings about the presence of BART (Q19B), other aspects of the general evaluation of the system by persons living at these sites are reviewed, including its effects on the respondent's life in and around his or her home (Q19A), how a respondent's feelings reflect those of other members of the sampled household (Q19D and 19E), and whether the respondent feels it would have been worth the extra expense -- in terms of his own taxes -- to put BART underground at his site (Q20).

The generally favorable attitudes towards BART do not mean that it goes unnoticed by persons living within a few blocks of its facilities, although that is true for as many as 40 percent of the sample at one site we studied. Variation is high: the percentage of persons noticing BART "quite a lot" either inside their homes or out in the yard (Q10) ranges up to 62 percent at one site and down to 18 percent at another. In the following, we consider how this awareness of BART varies among the ten different sites, whether awareness is markedly different when away from home but in the neighborhood (Q11A), or in the home at different times of day (Q18), and whether particular features of BART's presence or operations are more noticeable than others (Q10B, 10C; 11B, 11C; 12).

Going beyond respondents' verbal evaluations, more overt forms of response may be more reliable indicators of the magnitude and importance of BART's effects. Some respondents have engaged in public or collective action in response to BART's actual or anticipated presence by talking with neighbors, attending meetings, signing petitions, and so on (Q21). In this chapter responses of this nature are also reviewed.

ORGANIZATION OF THIS CHAPTER

Throughout this chapter, discussion is limited to the broad issue of BART's overall environmental impact. Consideration of specific

types of impact is reserved for the next chapter. This is in keeping with the study's concern for first providing the broader perspective needed for proper interpretation of each level of successively more specific findings.

First discussed are findings of an earlier "pre-BART" study, then current awareness of BART's presence (including differences by time of day and different BART components), and finally general satisfaction with BART's local effects (for different types of sites, full-site versus first-stratum respondents, changes in attitudes over time, and feelings of respondent versus others in the household).

PRE-BART FINDINGS

A brief review of the pre-BART studies lends an historical perspective to this report's discussion of the 1976 survey.¹ In 1972, when BART construction was largely completed but revenue operations had not begun, interviews were conducted with a sample of some 2,500 persons living within one mile of the entire BART system. Over seventy per cent said they planned to make at least occasional use of the system, and nearly two-thirds (64 per cent) thought that BART was a "very good idea." Fewer than one in twenty of the sample were opposed to its development, and only one of every eight persons living within a quarter mile (about four blocks) of BART's above-ground lines and stations was unhappy that BART had been located so close to their residence. Generally favorable attitudes toward BART were also found by us three years later among local planning officials, traffic engineers, police officials, and other local community agents and leaders.²

AWARENESS OF BART'S PRESENCE

A substantial portion of residents surveyed, although not a majority in most sites, notice BART's presence "quite a lot" while in or around their homes. The primary intent here was to provide a general indicator of awareness of BART, to aid in our later assessment of its importance. The reasoning here is that if BART is "noticed quite a lot" only by a few of the people living nearby, its impacts are much less likely to be important to that population than if it were highly noticeable to many of them. Thus, it provides a context for interpretation of responses to questions on severity (i.e., importance) of BART's environmental impacts.

¹De Leuw, Cather & Company, Analysis of Pre-BART Urban Residential Environment Survey, op. cit.; Frances Carp et al., Residential Quality Prior to the Opening of BART, op. cit.

²Curtis Associates, Community Monitoring, op. cit.

A second purpose was to indicate exposure to the system's visual impacts. Residents were asked whether and what they noticed about BART, both at home (Q10) and in their immediate neighborhood (Q11). Differences by time of day were also probed (Q18). In addition, they were asked specifically about whether they could see BART trains, tracks, stations or parking lots from any window at home (Q12A) or in their yard (Q12B). This was intended as an indicator of which of BART's facilities was most noticeable, as a guide for future design emphasis.

Station Sites

Active awareness of BART varies from low to moderate at the three stations studied. Trains, tracks and station structures can be seen from home by more people than can the parking lots. As Table IV-1 shows, BART is noticed "quite a lot" when at home by nearly half of the Daly City respondents, about a quarter of Concord respondents and only about one in five of El Cerrito respondents. Among these station sites, El Cerrito residents are also most likely to be completely unaware of BART's presence from their home: 34 per cent do not notice BART at all from their homes, as compared with about 20 per cent at the other two station sites. Thus, there are large variations in BART's "intrusiveness" into the home from one station site to another. However, in all three station sites studied BART is noticeable to a substantial minority. This suggests that station-area impacts may be of concern to a fairly large number of people.

Table IV-1
PERCEPTION OF BART AT HOME VS. NEARBY

	Percent of Respondents									
	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
<u>Q10A. Notice BART in/outside home</u>										
Quite a lot/Not at all	26/17	48/20	18/34	36/26	62/7	27/15	51/12	41/16	30/35	24/40
<u>Q11A. Notice BART in neighborhood away from home</u>										
Quite a lot/Not at all	28/47	21/63	15/50	15/49	2/64	25/52	8/76	12/57	18/46	10/59
<u>Number of Cases</u>	(96)	(50)	(103)	(118)	(45)	(52)	(51)	(49)	(88)	(50)

When away from home but still in their neighborhood, about half of the respondents at each of the three station sites say they do not notice BART. Many of the remainder apparently notice BART only a little. This is counter to expectation, and suggests that the quiet home environment is much more sensitive to the introduction of new nearby features such as BART than is the broader public area of the neighborhood.

BART trains, rather than other aspects of the system, are most likely to be noticed from their homes by El Cerrito and Daly City residents, with the station and parking lot also noticed by most Daly City residents (Table IV-2). For Concord residents, trains and tracks are the most noticeable features, but these are noticed from the yards rather than

Table IV-2
ASPECTS OF BART VISIBLE FROM HOME

	Percent of Respondents									
	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
<u>Q12A,B. Aspects of BART visible from the home</u>										
Trains From windows/From yard	33/62	70/32	69/45	67/63	93/70	60/67	77/94	63/69	68/64	58/56
Tracks From windows/From yard	30/49	46/26	55/34	62/60	82/65	48/48	69/78	60/60	52/52	34/34
Station From windows/From yard	21/32	76/26	48/28	- Not Applicable -					-	-
Parking Lot From windows/From yard	21/37	54/26	25/14	- Not Applicable -					-	-
<u>Number of Cases</u>	(96)	(50)	(103)	(118)	(45)	(52)	(51)	(49)	(88)	(50)

from within their homes. From a quarter to a third of respondents at other station sites notice BART from their yards, ranging up to nearly half of the El Cerrito residents noticing BART trains.

The predominance of trains and tracks suggests that the height of the elevated tracks is an important determinant. More important, however, is the fact that all of the station-area BART components - trains, tracks, station and parking lot - were found to be visible to surprisingly large proportions of the surveyed populations.

Aerial Line Sites

Awareness of BART from in and around the home is higher, on the average, among aerial line sites than at stations or at-grade line sites. Few residents are unaware of its presence; from the results in Table IV-1, the mean number of respondents not noticing BART at all is only 15 per cent. Nearly two-thirds (62 per cent) of the Albany West respondents notice its presence "quite a lot," a figure higher than at any other study site. The mean for all five aerial line sites is 43 per cent, in contrast to 30 per cent at the stations.

When away from home but in the local neighborhood, awareness of BART at the Albany West site declines sharply (from 62 per cent when at home to only two per cent in the neighborhood). A decline in awareness of BART is evident at all other aerial sites but Oakland, but is less sharp (see Table IV-1).

Respondents at all aerial sites report noticing trains slightly more often than the aerial structure itself. However, both are very widely noticed, suggesting that perception of impacts may be extensive. Qualitative responses (Q10B, 11B) make clear that the noise from passing trains is BART's most intrusive feature for these respondents.

At-Grade Sites

Although fewer than in aerial sites, substantial numbers of residents in at-grade sites still notice BART "quite a lot." BART is noticed "quite a lot" from their homes by about one person in four at the two line sites studied where the tracks are at-grade (30 per cent at Richmond and 24 per cent at Hayward South). Some two-fifths of the respondents do not notice it at all from their homes (40 per cent at Hayward South and 35 per cent at Richmond). This supports the intuitive expectation that track elevation is a key determinant.

When away from home but in the neighborhood, awareness declines at both sites but remains somewhat higher at Richmond (18 per cent notice it "quite a lot" there, ten per cent at Hayward South -- see Table IV-1).

Trains are noticed by well over half the residents of the at-grade sites whether from within their homes or in their yards. While about half (52 percent) of the Richmond residents can see BART tracks from their homes and yards, this is true of only a third (34 percent) of those living at Hayward South. Again, awareness of these specific features is somewhat greater at the Richmond site than at Hayward South. Train noise is the most noticeable feature of BART at both of these at-grade sites.

Persons Living Directly Adjacent to BART

Not surprisingly, persons living directly adjacent to BART are more likely to notice BART from their homes than are persons living further away, regardless of type of site. For the station sites these discrepancies are smaller than expected, ranging from six to nine percentage points. For the aerial line sites they are in most cases much larger: 90 percent of first stratum respondents at the Hayward North site notice BART from their home, as compared to 51 percent from the site as a whole; 60 percent first stratum respondents at Albany East as compared to 36 percent overall; and 47 percent first stratum respondents at Oakland versus 27 percent overall for that site. For the at-grade sites, increased awareness of BART from homes in the first stratum was 13 to 18 percentage points over the proportions shown in Table IV-1 for the whole sites.

Away from home but in the local neighborhood, on the other hand, first stratum respondents report less awareness of BART than do the other respondents in all but two sites. However, in seven of the ten sites the discrepancies were five percentage points or less. Differences of 7 to 20 percent were found at the Daly City and Concord station sites and the Albany East aerial site.

These results suggest that BART's environmental impacts may be very important to directly adjacent residents, but are probably of lesser significance even to those living only a block or two farther away. This will be investigated in subsequent sections.

Time of Day

BART is particularly noticeable to nearby residents during the PM commute period and early evening hours. BART is noticed from the home during the early morning rush hour (up to 7 AM) by about half of the respondents at each station site, with a decline in intrusiveness between 7 and 9 AM occurring only for El Cerrito residents (Table IV-3). Prior to the evening rush hour BART is noticed by relatively few respondents at the station sites (12 percent to 16 percent) except for Daly City, where about a third are aware of its midday transit. This is probably due to that station's greater train frequency (6 minutes versus Concord's and El Cerrito's 12 minutes).

Table IV-3
PERCEPTION OF BART BY TIME OF DAY

	Percent of Respondents									
	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
Q18. Time of day BART noticed from home										
(% very or fairly likely to notice)										
4 - 7 AM	48	48	48	58	57	53	58	39	43	44
7 - 9 AM	44	57	30	30	13	40	55	14	39	12
9 AM - 4 PM	16	30	12	32	6	38	46	21	32	31
4 - 7 PM	63	76	35	60	47	70	74	39	61	56
7 - 10 PM	20	27	42	69	57	60	61	50	34	25
10 PM - 1 AM	30	12	27	52	23	40	48	28	26	25
Number of Cases	(96)	(50)	(103)	(118)	(45)	(52)	(51)	(49)	(88)	(50)

The evening rush hour is BART's most intrusive time for these respondents: 63 percent and 76 percent notice it from 4 to 7 PM at Concord and Daly City, respectively. Awareness is lower than at El Cerrito, but lasts longer: it is noticed by 42 percent of El Cerrito respondents during the evening hours of 7 to 10 PM, when awareness has declined at the other two station sites. From qualitative data elicited during the interviews (Q18C) we learn that passengers and auto traffic are the most noticed aspects of BART at Daly City; train noise at El Cerrito and Concord.

Somewhat over half of the respondents at each aerial site except San Leandro notice BART before the early morning rush period (from 4 to 7 AM). At San Leandro the figure is somewhat lower. At Albany West this awareness declines sharply between 7 and 9 AM and continues to decline to a low of six percent who are "fairly" or "very" likely to notice BART prior to the beginning of the evening rush hour (4 PM). A less sharp midday decline in awareness is also evident at most of the other aerial sites.

Perception of BART during the evening rush hour is at a maximum at Hayward North and Oakland (74 percent and 70 percent, respectively) and is also high at Albany East and Albany West. At San Leandro it is somewhat lower (39 percent), as it is in the morning rush period.

Awareness of BART during the later evening (7 to 10 PM) is less variable over the aerial sites, ranging from a low of 50 percent at San Leandro to a high of 69 percent at Albany East. At this last site as well as at Hayward North about half of the respondents report noticing BART after 10 PM, and the figure is nearly as high at the Oakland site.

The proportion of residents "particularly noticing" BART in each time period are almost the same for both at-grade line sites. Here too the peak is during the PM commute period (56 and 61 percent) and is near the middle of the range identified for the aerial line sites. However, in contrast to the continued high level of awareness of BART in all five aerial sites on through the early evening (50 - 69 percent), in both at-grade sites the proportion noticing BART drops to 25 - 34 percent in the at-grade sites after the rush period. Except for the PM rush period, in fact, the majority of respondents in both these sites reported no particular awareness of BART at any time of day.

These results indicate that the greatest problems for nearby residents are likely to occur in the early morning hours and during the evening rush period. Awareness is generally much lower during midday and late-night hours, although proportions of people who notice BART are still significant at all hours of operation. It appears that BART is never "forgotten" by many of these nearby residents.

GENERAL SATISFACTION WITH BART

The next stage in the analysis concerns residents' evaluations of BART, now that the degree to which they notice it has been determined. When asked to sum up their overall feelings about BART, including not only its impact on the environment but also taxes, travel patterns, and anything else they considered significant (Q19B), most respondents to the 1976 survey replied favorably. As shown in Table IV-4, at all ten sites the proportion who were "fairly" or "very happy" about BART was substantially higher than the proportion who were unhappy. The same holds true, with minor exceptions, for the system's environmental effects alone -- in and around the home (Q19A). The two minor exceptions, as shown in the table and to be discussed below, are at two aerial line sites where positive and negative feelings about BART's local impact are about equally balanced.

Table IV-4
GENERAL FEELINGS TOWARD BART¹

Percent of Respondents												
Stations			Aerial Lines					At Grade Lines				
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.			
Q19B. Overall Feelings About BART ²												
"Happy"/"Unhappy"			58 _{/26}	72 _{/10}	82 _{/14}	60 _{/25}	49 _{/31}	51 _{/32}	63 _{/32}	66 _{/32}	65 _{/19}	56 _{/24}
Q19A. Feelings About BART's Effects In/Around Home												
"Happy"/"Unhappy"			52 _{/21}	58 _{/16}	59 _{/2}	27 _{/28}	47 _{/31}	48 _{/12}	32 _{/32}	47 _{/22}	49 _{/10}	40 _{/6}
Q20. Would Pay To Have BART Underground Here												
"Yes, Worth It"			31	40	24	60	67	37	48	39	34	12
Number of Cases			(96)	(50)	(103)	(118)	(45)	(52)	(51)	(49)	(88)	(50)

¹Figures show percent of all respondents at indicated site. Responses of persons living directly adjacent to BART (first sample stratum) were generally similar with exceptions noted in text.

²Response categories for this and subsequent questions have been combined (e.g., "happy" here combines categories "very happy" and "fairly happy"; see questionnaire for details). Additional proportions required to total 100 percent in each case generally represent indifferent responses such as "can't say," or "no effect."

In order to make the issue of satisfaction more realistic, respondents were also asked whether they would have been willing to pay an extra dollar or two per month to get BART placed underground near their home (Q20).¹ At eight of the ten sites a majority of respondents did not support this hypothetical option. However, over 30 percent of the respondents at all but one site were willing to pay, indicating a substantial minority at least tacitly in disagreement with the use of the above-ground configurations chosen. This disagreement is apparently mild, since in the same sites the proportions who directly expressed unhappiness with the system and its local effects were typically much smaller (cf. Q19B and 19A versus 20, Table IV-4).

Station Sites

In general, the level of acceptance of BART in station-area neighborhoods seems very high. Of the ten sites studied, two of the three station sites (Daly City and El Cerrito) responded the most favorably to BART. Comparing across sites the figures showing percent "happy" in Table IV-4, it can be seen that this holds true with regard to both the overall impression of BART and BART's effects in and around the home. At the third station site, Concord, overall satisfaction is somewhat lower than at some nonstation sites (58 percent at Concord versus 60 percent to 66 percent at four of the remaining seven sites). Nevertheless, BART's local (environmental) effects in and around the home, which are our primary concern, are still seen more favorably at Concord than at any nonstation site. In these general respects, therefore, BART appears more favorably received at station sites than at the other types studied.

The absolute levels of reported satisfaction and dissatisfaction at the station sites, as shown in the table, are particularly significant. While there is some unhappiness, both overall and with respect only to the environmental effects, positive responses predominate by over two to one in every case.

Aerial Line Sites

Although respondents happy with BART and its local effects outnumber those who are unhappy in the aerial sites, there are substantial levels of dissatisfaction in four of the five sites.

Some two-thirds of the respondents are generally pleased with BART overall (see Table IV-4) at three of the five aerial line sites. These generally favorable feelings characterize about half of the respondents at the other two aerial sites (Albany West and Oakland). Still, a substantial number -- between 25 and 32 percent -- of the respondents at any aerial site are generally displeased with BART. The remaining respondents are generally indifferent.

¹This amount is roughly what the citizens of Berkeley are paying in additional property taxes for just such a change.

Feelings of satisfaction with BART's more localized effects -- in and around the home -- are less common than feelings of satisfaction with BART more generally. At the same time, actively negative feelings about these local effects are also less common or about the same as dissatisfaction with BART overall; the differences in response to the two items appear to be a trend from "happy" with BART overall to "indifferent," "don't know" and such noncommittal answers regarding its local effects. Positive feelings regarding local impact still outweigh negative feelings at three of the five aerial sites, and at the remaining two (Albany East and Hayward North) they are equally balanced. Nevertheless, these results indicate rather high levels of dissatisfaction.

At-Grade Line Sites

In at-grade line sites, there tend to be several times more respondents happy than unhappy with BART and its local effects. Favorable overall reactions to BART were expressed by 56 percent to 65 percent of the respondents at the two sites where the BART line was constructed at grade (see Table IV-4). Positive feelings about BART's general impact in and around their homes were expressed by fewer than a majority (40 percent and 49 percent), but displeasure was expressed by relatively few (six percent and ten percent); the remainder were indifferent.

In both of these respects, as can be seen from the table, negative responses to BART were less frequent at the two at-grade sites than at any of the five aerial sites.

Respondents Nearest BART (All Site Types)

With some exceptions, persons living right next to BART reported about as much satisfaction with the system as did the respondents living from one to three blocks farther away from it.

The issue here was whether the nearest residents were substantially unhappier with BART due to their greater exposure to its impacts. The responses to the same two questions were investigated, including general attitude about BART (Q19B) and attitude toward its "effects in and around the home" (Q19A).

Overall responses to BART (Q19B) from the nearest stratum at the three station sites studied differed from those for the full sites by no more than four percentage points, and by no more than six points at the two at-grade sites. These are not significant. For the aerial line sites, we expected first stratum responses to be much more negative than the rest because of the BART train noise. However, the differences found were larger but also unpredictable in direction, contrary to our expectations. Seventeen percent more of the first stratum responses were favorable at the Oakland aerial line site, and 16 percent fewer of the first stratum responses were favorable at the Hayward North site (47 per-

cent favorable in the first stratum versus the 63 percent favorable for the full site).¹ These differences are a significant exception to the general finding.

The inconsistency continued among the other aerial line sites. At Albany East, first stratum respondents were slightly less favorable (53 percent satisfied versus 60 percent overall), and at San Leandro slightly more favorable (72 percent satisfied versus 66 percent overall).

As for BART's general impact in and around the home (Q19A), which is of greater interest here because of its direct connotation of environmental impact, at only four of the ten sites did the percentage giving a favorable response in the first stratum depart by more than four percentage points from the overall response at that site. One of these was the Concord station, where the "satisfied" percentage fell from 52 percent overall to 41 percent in the first stratum. The other three were aerial line sites: at Hayward North and San Leandro to the percent favorable response (to Q19A) from the first stratum was somewhat lower than overall -- from 32 percent to 26 percent and 47 percent to 36 percent, respectively. At the Oakland aerial site, first stratum responses were substantially more favorable (63 percent versus 48 percent overall).

These results suggest that BART's overall environmental impact is not necessarily always felt most heavily by the very nearest residents. This may depend on the specific impacts, environment and population involved, which will be examined more closely in later chapters.

Stability of General Feelings Over Time

Roughly half of the respondents said they felt differently in 1976 about BART than they did when the system's revenue service began, but at no site have these reported shifts in opinion been consistent enough to result in a dramatic change in the response to BART. The intent here was to find out whether opinions of BART seem to have either improved or deteriorated substantially since the system opened. About half the respondents in each of the three station sites cited no change (Table IV-5). Of the respondents whose attitudes did change, most of those at the El Cerrito site feel better about BART now than at first. Those in the Concord and Daly City sites are nearly evenly divided between feeling better and worse, which indicate a net result of very little, if any, overall shift in attitude.

¹Since the first stratum included about 40 percent of each site's respondents, a difference of 16 percent between the proportions found in the first stratum and the whole site sample (including the first stratum) implies that the difference in satisfaction between the first stratum residents and the rest is actually nearly 27 percent.

Table IV-5
REPORTED DIFFERENCES IN ATTITUDE TOWARD BART OVER TIME AND WITHIN HOUSEHOLD¹

Percent of Respondents										
Stations			Aerial Lines					At Grade Lines		
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.	
<u>Q19C. Changes in feelings since BART began service</u> Felt worse then/ Felt better then										
22/33 22/28 36/13			32/18	38/30	34/20	16/24	33/22	23/26	34/26	
<u>Q19D.E. Feelings of others in household</u> Same/Unhappy, if different ²										
92/60 87/40 80/21			90/67	81/57	73/56	92/67	89/0	96/0	84/43	
<u>Number of Cases</u>			(96)	(50)	(103)	(118)	(45)	(52)	(51)	(49)
								(88)	(50)	

No particular changes in feelings about BART since service began were reported by about half of the respondents at all but one (Albany West) of the aerial line sites and both at-grade line sites. At that Albany West site where opinion changes (reported by 68 percent) were substantial, there was little consensus about the direction of changes: 38 percent said they had felt worse about BART when service began and 30 percent felt better.

These results suggest that general attitudes toward BART, as remembered by the respondents, have been quite stable. Overall, BART is neither winning friends nor making enemies among those living near it.

¹See footnote, Table IV-4.

²The latter percentages are illustrative only, being based on the very few respondents (from two to 14) who reported that some household members felt differently.

Feelings of Others in Household

In all ten sites, almost all respondents (73 - 96 percent) reported that other members of their households generally agreed with their own feelings about BART. This item was included as an indicator of whether the attitudes within households varied widely or were well represented by the respondents. The very high proportions of agreement noted in Table IV-5 show clearly that most respondents perceive no disagreement in their households.

Of those relatively few who report disagreement within the household, a small majority indicated that others in their home were slightly more likely to be unhappy with BART in five of the ten sites; four of these were aerial line sites. These percentages, as noted in the table, are based on very few cases and in any case are insignificantly different from an even split (50 percent).

PUBLIC ACTIONS IN RESPONSE TO BART

Very few respondents have participated in any public actions, such as voting, signing petitions or attending meetings, either for or against BART. The development of BART did not, of course, occur without controversy. Respondents were asked whether they had ever expressed views for or against BART, even in talking with neighbors. Forms of expression of public opinion which occurred with more than insignificant frequency are shown in Table IV-6.

These responses provide a further indication of the low intensity of feelings held by nearby residents toward BART. The rationale here is that overt public actions taken are clearer evidence of strongly held feelings than are self-reported "attitudes." The low level of active opposition, in particular, reported in Table IV-6 supports the earlier findings of generally low levels of unhappiness with the BART system and its overall effects on the residential environment.

Among the station sites, verbal expressions of opinion and votes for candidates favored BART at El Cerrito, and opposed BART at Daly City and Concord. On balance, petitions signed by respondents, and BART-related meetings attended, were in opposition to BART at all three station sites, although the level of involvement was very low. Opposition petitions and meetings were most frequent at Daly City, but even here involved only 15 - 18 percent of the respondents.

Talk with neighbors, a minimal form of public action, was generally opposed to BART among respondents interviewed at all aerial sites but Oakland, where it was equally balanced. Verbal opposition was most pronounced at Albany West (33 percent opposed to two percent supporting) and Hayward North (22 percent opposed to eight percent supporting).

Similarly, respondents reported more votes for candidates opposing than supporting BART at each aerial site except Oakland, where the opposite was the case, and Hayward North, where opposition and support were equally balanced.

Table IV-6
PUBLIC ACTIONS TAKEN FOR AND AGAINST BART

	Percent of Respondents									
	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
<u>Q21. Public actions for or against BART</u>										
Talked to neighbors ¹ Pro-BART/Anti-BART	16/ 37	16/ 20	32/ 9	10/ 34	2/ 33	17/ 17	8/ 22	14/ 33	14/ 19	26/ 10
Voted for candidate who took position on BART Pro-BART/Anti-BART	1/ 0	2/ 4	5/ 1	3/ 12	2/ 13	8/ 2	4/ 4	0/ 8	2/ 0	8/ 0
Signed a petition for/ against BART Pro-BART/Anti-BART	2/ 9	0/ 18	3/ 6	1/ 9	0/ 13	2/ 6	2/ 4	2/ 6	0/ 8	8/ 0
Attended a BART-related meeting ¹ Pro-BART/Anti-BART	1/ 1	2/ 15	0/ 5	0/ 3	0/ 9	4/ 0	0/ 0	2/ 8	0/ 3	0/ 0
<u>Number of Cases</u>	(96)	(50)	(103)	(118)	(45)	(52)	(51)	(49)	(88)	(50)

¹The responses indicating neither support for nor opposition to BART (e.g., talked with neighbors about BART without taking a position) have been omitted.

Petitions signed by respondents at aerial sites were generally opposed to BART, as were BART-related meetings except for Oakland. Hayward North respondents reported no meetings.

Expressions of public opinion by residents of the Richmond site, with the BART line at-grade, were mixed: 19 percent expressed anti-BART views to neighbors, 14 percent expressed pro-BART views. Eight percent at that site signed petitions in opposition to BART. At Hayward South, the remaining at-grade site, public expression was consistently favorable: eight percent voted for pro-BART candidates, eight percent signed petitions in favor of BART, and pro-BART talks with neighbors outweighed anti-BART talks by 26 percent to ten percent. This is the only site among the ten studied at which respondents reported pro-BART petitions more commonly than petitions opposed to BART.¹

BART and Mobility

BART was reported as a cause of neighborhood residents moving away by a substantial minority of respondents in aerial line sites, and a reason for people moving into the station sites. An important behavioral response to BART involves mobility: both actual moving into and out of a neighborhood and expressed preferences to leave the present residence. BART has had an impact in both respects, though varying according to the configuration of BART within the site (i.e., stations, aerial structure, or tracks at-grade).

Respondents were first asked whether they chose their own present home for reasons related to BART. As shown in Table V-7, individuals living at stations (Daly City - 16 percent; El Cerrito - 22 percent; Concord - 15 percent) had a higher predominance of such residents than other sites, most of which had few such residents (with one exception, Oakland at 12 percent; the rest were six percent or below). Interestingly, such residents seemed to be found mainly in the first two strata, suggesting a desire to minimize their distance to BART. Respondents were also asked if they knew anyone else who moved into the neighborhood because of BART. Again, such responses were more likely to occur in station sites (e.g., Daly City - 20 percent; El Cerrito - 13 percent; Concord - 18 percent), while in most other sites affirmative responses were negligible. As with individual reports of actual mobility, these respondents were more commonly in the first two strata.

¹The unique Berkeley experience deserves comment here despite the fact that no Berkeley survey site was included in this study. The citizens of Berkeley organized an effective protest against BART's planned use of an aerial trackway configuration in that city. The main concern was that the highly visible aerial track might become a symbolic separation of "richer" and "poorer" (or white and black) portions of the community, as well as an environmental disruption. This protest led to the city's adoption of a bond issue by referendum to cover the additional cost of placing BART underground throughout Berkeley. There were no similar public movements elsewhere.

Table IV-7
INDICATORS OF BART'S EFFECT ON IN-MIGRATION

Percent of "Yes" Responses										
Stations			Aerial Lines						At Grade Lines	
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.	
<u>Q28A. Chose home because of BART</u>										
All respondents:	15	16	22	3	0	12	4	6	3	4
Strata 1 & 2:	16	23	23	6	0	8	5	6	3	0
Stratum 1 only:	13	19	28	3	0	11	2	9	3	0
<u>Q30B. Know others who chose home for BART</u>										
All respondents:	18	20	13	5	7	2	0	2	3	8
Strata 1 & 2:	18	14	15	7	7	0	0	2	3	3
Stratum 1 only:	18	24	24	5	7	0	0	5	3	0
<u>Number of respondents</u>										
All respondents:	(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)
Strata 1 & 2:	(67)	(35)	(69)	(67)	(43)	(36)	(35)	(35)	(60)	(34)
Stratum 1 only:	(38)	(21)	(39)	(40)	(29)	(19)	(19)	(22)	(35)	(19)

What of the expressed desires to move away? As Table IV-8 shows, there were marked differences among sites. However, these seem to be for reasons more complex than merely the presence of certain BART attributes. For example, respondents at the Daly City station, El Cerrito Plaza station, and the Albany and Oakland aerial line sites were fairly low in the desire to move (i.e., between 25 - 30 percent), while the Concord station, Richmond station and Hayward line sites were fairly high (i.e., around 40 percent). High or low considerations of moving seem to cut across BART attributes, probably indicating the relative importance of other factors such as life cycle, economic status, and home ownership rates in these areas. An important question is left unanswered in these studies, though: whether rates of moving are basically the same in other Bay Area communities far from the BART line.

Table IV-8
INDICATORS OF BART'S EFFECT ON OUT-MIGRATION

	Percent of "Yes" Responses									
	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
<u>Q29A. Considered moving away in last few years</u>										
All respondents:	40	26	26	30	24	29	37	43	43	38
Strata 1 & 2:	46	26	29	34	24	28	40	43	45	35
Stratum 1 only:	42	29	33	28	23	21	42	55	51	32
<u>Q29B/C. Was BART at least part of reason</u>										
All respondents:	48	8	8	45	64	7	53	42	14	5
Strata 1 & 2:	51	11	5	60	64	10	71	62	15	0
Stratum 1 only:	48	0	8	55	71	25	88	67	22	0
<u>Q30A. Know others maybe moving due to BART</u>										
All respondents:	19	16	4	18	18	2	12	14	6	6
Strata 1 & 2:	21	14	6	28	18	3	17	17	6	3
Stratum 1 only:	24	14	8	28	27	5	67	14	11	0
<u>Number of Respondents *</u>										
All respondents:	(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)
Strata 1 & 2:	(67)	(35)	(69)	(67)	(43)	(36)	(35)	(35)	(60)	(34)
Stratum 1 only:	(38)	(21)	(39)	(40)	(29)	(19)	(19)	(22)	(35)	(19)

With these general results in mind, we analyzed data involving reasons people gave for wanting to change residences. Specifically, how often was BART mentioned as a reason to move? Again, BART attributes seemed to influence these responses. Individuals living along aerial structures most often asserted that BART was the reason (or part of the reason) for

*These numbers are for questions 29A and 30A. Response proportions reported for question 29B/C are based on the (smaller) number of persons who responded affirmatively to question 29A.

wanting to move -- for example, about 50 percent of those wanted to move in Hayward North, San Leandro, and Albany cited BART. BART's role in other sites was small, with one exception: Concord Station. Another exception to the overall pattern could be seen in the Oakland site: though along an aerial structure, few respondents here mentioned BART as a reason to move, perhaps because of "background" activity (especially traffic) masking BART's environmental effects, or because of more pressing environmental problems (e.g., crime, housing). As with the earlier items, the most marked BART impacts on moving desires were found in the first two strata. In general, the findings can be summarized in this way: aerial sites have the highest prevalence of expressed mobility preferences, and especially in those blocks closest to the BART line; at-grade sites tended to have uniformly the lowest rates.

Finally, respondents were asked whether they knew of others who had moved away from the neighborhood because of BART. Here, a marked difference emerged between aerial and at-grade sites: the former had rates two and three times higher than the latter (with the exception of Oakland, as before). However, no uniform trend could be found for the station sites: at Daly City and Concord there were rates close to those of the aerial sites, while the El Cerrito Plaza station site seemed similar to at-grade line sites in this respect. This is consistent with the perceptions reported earlier in this chapter, and is probably because of differences in the severity of BART-related activities (e.g., parking, traffic) among these station sites. Again, the first two strata were the scenes of the greatest perceived moving activity.

When we examine sites on the basis of perceived migration into and out of the neighborhood due to BART several interesting hypotheses emerge which could conceivably affect housing factors such as vacancy rates, property values, and turnover rates. First, BART probably has little impact upon these housing factors in at-grade line sites. Second, it seems as though it may have a negative impact (i.e., higher vacancies, lower property values) at most areas because of BART. Third, BART would seem to have differential impacts upon these housing factors at the station sites. Apparently there are more people wanting to move in than out of the neighborhood at El Cerrito, perhaps leading to lower vacancy rates and higher property values. However, the tables show that fairly large numbers of respondents reported knowing of people both moving into and out of the Daly City and Concord sites due to BART. This could perhaps lead to higher turnover rates and lower vacancy rates than at aerial sites and perhaps no net change in property value due to BART-related factors. Given the importance of housing and mobility issues in individuals' experiences, these hypotheses deserve further attention. One initial attempt to pursue these hypotheses regarding BART as a cause of moving behavior is provided in Chapter VII. In addition, a small sample of realtors was interviewed for their independent appraisal of BART's effect on sales near the line. All agreed that the transit lines and stations had had little if any effect on sales prices.¹

¹ Curtis Associates, Phase II Community Monitoring, BART Impact Program Report WN 3-4-77, Berkeley: Metropolitan Transportation Commission, 1977.

V. SPECIFIC ENVIRONMENTAL IMPACTS

The previous chapter provided indications of generalized response to BART and its effects on neighborhoods along the right-of-way. This general response was found to be indifferent or positive; relatively few persons said that they felt BART was a bad idea or that its overall effect in their neighborhood had been bad, although there were substantial variations from site to site. In addition, few had taken any actions either for or against BART, and there were only marginal indications that BART has had any good or bad effect on residents' decisions to move into or out of the neighborhoods abutting the lines and stations.

The present chapter seeks to expand upon these general findings by focusing on each of the different specific types of impact which were identified. The intent here is twofold; first, to find which, if any, kinds of impacts tended to be viewed as substantial benefits or detriments by the residents affected; and second, to identify the degree to which each of the study's earlier technical impact assessments are in agreement with the impacts as judged by the residents themselves.

To summarize the results of this chapter's analysis, two general conclusions can be drawn:

- Although most residents are indifferent to most specific impacts of BART, the effects of overflow parking at stations and train noise along aerial lines are widely viewed as the system's worst impacts.
- The conventional technical impact assessments conducted earlier in the study do match the evaluations by residents in most cases, although residents are generally more indifferent than expected.

The detailed findings which led to these conclusions are presented in the following sections according to type of impact. The ten-site interview survey included an extensive battery of items on specific impacts. Open-ended questions were also included, designed to allow the respondent to give more detailed explanations of feelings as well as to identify any other impacts not specifically covered in the questionnaire. The resulting topics for this chapter's analysis are as follows:

<u>Environmental Component</u>	<u>Impact Category</u>
ACOUSTICS	Sound Vibration
ATMOSPHERE	Local Air Quality Wind Electromagnetics (TV)
LAND & WATER ECOLOGY	Natural Features
NEIGHBORHOOD TRAVEL	Traffic Congestion Safety Parking Barrier Effects
SOCIAL ENVIRONMENT	Privacy Security from Crime Population Composition Housing
VISUAL QUALITY	Appearance View Lighting Shadows

In addition to these impacts of BART as a physical and operational entity, the perceived effects of the system's construction were recorded in the survey for those who experienced them. Results of these construction impact inquiries are also included as this chapter's initial section and impart a longitudinal perspective to the survey's results.

CONSTRUCTION IMPACTS

Persons who have lived nearest BART since it was built tend, by a small majority, to remember the effects of its construction on their neighborhood as "bad" or "very bad." Residents in at-grade line sites are generally the least negative in their memories of BART construction; the majority interviewed were indifferent to virtually all aspects of the construction's impact. In contrast, the majority of respondents in most station and aerial line sites rated most specific types of BART construction impact as "bad" or "very bad." Impacts most often cited as adverse were dust and dirt, noise, truck traffic, torn-up streets, and removal of homes.

For the full four-block deep sites, the overall effects of the BART construction work were rated as insignificant, balanced or good (rather than adverse) by a small majority in most cases; however, a majority of respondents living within one block of BART rated the overall effect as adverse in all sites except the at-grade line neighborhoods.

The "Pre-BART" Findings¹

In the 1972 survey of residents near BART,² respondents were queried in some detail concerning the effects of the system's construction. For the 2500-case "systemwide" sample, only a small minority reported adverse effects of any sort. Within 1/4 mile (about four blocks, similar to the 1976 survey's site depth) overall adverse effects were reported more frequently but by a majority only along the system's subway portions.

In that early survey's "special sites," which abutted BART and were typically only about two blocks deep (1/8 mile), about half did report adverse effects of at least one kind or another. Most common were dust and dirt (27 percent), noise (20 percent), and traffic (20 percent). Locations with the highest incidence of complaint tended to be at above-ground stations with parking lots, where construction activity probably was in fact particularly extensive.

Overall Effect of Construction

Most people throughout the case study sites who were exposed to BART's construction were not unhappy about its effects. From 47 percent to 76 percent of the 1976 survey respondents had been living in the same building or neighborhood during BART's construction there. Of these, from 45 percent to 77 percent (over 55 percent in seven of the ten sites; see Table V-1) reported that the overall effect of the construction work on them had been good, evenly balanced good and bad, or had had no significant effect. As the table indicates, responses were particularly mild at both at-grade line sites and the El Cerrito Plaza station, where over two-thirds were neutral or favorable.

Specific Effects

In most sites, the majority of respondents who perceived any overall impact felt that they had suffered bad effects in most of the specific construction impacts considered. As with the evaluations of overall construction impact just cited, respondents who had not lived in the neighborhood during BART's construction were deleted. In addition, those who had cited no overall effect in response to the earlier question were also excluded. This left only small samples, ranging from 12 to 37 respondents per site. As a result, the response proportions reported are only suggestive; however, they are strong and consistent enough to permit some important conclusions.

Seven specific types of impact were considered, as shown in Table V-2. Respondents were also asked for any other impacts they remembered; however, virtually none were offered, so it is assumed that the seven constitute a reasonably comprehensive set. Of these seven impacts in each of ten sites, at least half of all responses were "bad" or "very bad" for 41 of the 70 site-specific impacts.

¹Analysis of Pre-BART Urban Residential Environment Survey, Op. cit.

²Residential Quality Prior to the Opening of BART, Op. cit.

Table V-1
BART CONSTRUCTION'S OVERALL EFFECTS

WHOLE SITE

Q14B. BART construction's effects on neighborhood

"Good" or "Very Good"/
"Bad" or "Very Bad"

Number of Respondents

STRATUM 1

Q14B. BART construction's effects on neighborhood

"Good" or "Very Good"/
"Bad" or "Very Bad"

Number of Respondents

Percent of Respondents									
Stations			Aerial Lines					At Grade Lines	
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
15/55	27/55	12/33	8/39	7/55	11/43	8/42	16/39	16/30	19/23
(53)	(33)	(51)	(61)	(28)	(35)	(24)	(31)	(56)	(37)
4/57	21/64	16/53	8/58	5/62	15/77	13/75	10/50	19/38	21/29
(23)	(14)	(19)	(24)	(21)	(13)	(8)	(10)	(21)	(14)

Viewed slightly differently, a majority of respondents was unhappy with most of the specific impacts in seven of the ten sites. It is of interest that the three sites with least often reported specific construction impacts were the two at-grade line sites plus El Cerrito Del Norte station -- the same three sites in which respondents were also least likely to judge BART's overall construction impact as adverse.

The impact most frequently cited as bad was "dust and dirt." Others included noise, truck traffic, streets dug up, homes removed, and the duration of construction itself (see Table V-2). A majority of respondents termed these all adverse in a majority of the sites. Thus it is concluded that specific impacts were substantial, although not overwhelming, and particularly so at stations and along aerial lines.

Table V-2
SPECIFIC EFFECTS OF BART CONSTRUCTION

Q14C. Specific effects of
BART construction

Percent of Respondents										
Stations			Aerial Lines					At Grade Lines		
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.	
14/54	15/56	8/52	0/86	0/67	21/58	8/67	0/88	4/46	6/47	
8/58	11/48	8/36	3/41	6/56	11/58	8/50	18/53	0/31	6/25	
5/70	4/74	0/68	3/62	0/72	5/74	0/75	6/82	0/50	6/50	
11/57	4/65	0/36	3/31	0/67	5/68	0/67	18/24	4/31	0/47	
8/41	11/59	24/36	10/66	0/77	16/53	0/0	18/55	4/8	0/18	
17/28	11/33	4/16	21/11	11/22	5/42	0/50	18/18	12/27	0/12	
14/69	4/48	13/54	3/52	6/72	21/58	0/64	18/47	15/31	12/65	
(37)	(27)	(25)	(29)	(18)	(19)	(12)	(17)	(26)	(17)	

Respondents Nearest BART

A majority of residents whose homes abutted BART judged BART's overall construction impact on them to have been adverse in all except the at-grade line sites. Despite very small sample sizes, the proportions of respondents reporting adverse impact were substantially and consistently higher in the first sampling stratum (Table V-1) than for the complete sites (Table V-1). These proportions were 50 percent or higher in eight of the ten sites, with the two at-grade line sites, Richmond and Hayward South, being the only exceptions. This suggests a significant difference in the intensity of perceivable impact between the block nearest BART and the nearest 1/4-mile. Such a finding is supported by the results in the 1972 survey's "special site," as reported earlier in this section. Apparently, then, the focus of concerns with construction impact should rest on the one or two blocks nearest the facility.

ACOUSTIC IMPACTS

BART-related sound is judged to be an adverse effect by most residents living close to the aerial lines. Vibration is a lesser but still significant problem in the same sites. With the exception of the Concord station site, where BART-related sound is widely perceived as a problem, both station and at-grade line sites are not heavily affected by either BART's sound or its vibration. Persons living within one block of the aerial lines were much more likely to judge both sound and vibration to be problems than were those living even a little farther away.

Sound

Prior Impact Assessments

The study's earlier technical assessment of BART train sound¹ resulted in the conclusion that potentially annoying effects were probably occurring only in quiet residential areas within about 200 feet in daytime (500 feet at night) of the aerial tracks with trains operating at high speed. Similar effects were felt to be possible but not as likely along at-grade lines, because of the slightly but measurably lower levels of train sound generated under that track configuration. Sound at stations, both from trains and BART-related traffic, was not expected to be of particular consequence.

Perception and Response

A majority of respondents in most aerial line sites rated BART's effects on sound levels in and around their homes as adverse, with especially high proportions within 1-1/2 blocks and much less concern farther away

¹Bolt Beranek & Newman Inc., Acoustic Impacts of BART, BART Impact Program TM 16-4-76, Berkeley: Metropolitan Transportation Commission, 1976.

and throughout the other sites. For the full sites, four of the five aerial line sites showed much more frequent adverse evaluations than found in the station or at-grade line sites (Table V-3). There were virtually no respondents who rated BART's effects on sound as beneficial. In both the station and at-grade line sites, the large majority of respondents were indifferent.

A further disaggregation of these results by stratum (Table V-4) yielded subsample sizes generally too small for statistical reliability. However, the proportions of adverse impact judgments declined rapidly, and consistently among sites, with increasing distance from BART. Even in the aerial line sites with most frequently reported bad effects nearest BART, beyond one or two strata (about 1-1/2 blocks from the BART track) the in-

Table V-3
ACOUSTIC IMPACTS BY SITE

	Percent of Respondents									
	Stations			Aerial Lines					At Grade Lines	
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
<u>Q16B. Noise inside home</u>										
"Very" or "Somewhat Good"	1/28	6/18	4/10	0/50	0/71	4/17	0/51	0/41	1/18	0/8
"Very" or "Somewhat Bad"										
<u>Q16C. Noise outside home</u>										
"Very" or "Somewhat Good"	2/41	6/26	6/14	0/55	0/67	6/19	0/45	4/51	2/18	6/6
"Very" or "Somewhat Bad"										
<u>Q16D. Vibration inside home</u>										
"Very" or "Somewhat Good"	1/5	6/16	4/4	1/27	2/50	2/14	0/31	2/22	1/14	0/4
"Very" or "Somewhat Bad"										
<u>Q16E. Vibration outside home</u>										
"Very" or "Somewhat Good"	1/9	2/16	4/7	1/29	0/51	2/19	0/20	4/23	0/9	0/6
"Very" or "Somewhat Bad"										
<u>Number of Respondents</u>	(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)

Table V-4
ACOUSTIC IMPACTS BY STRATUM

Percent of Respondents Indicating "Bad" or "Very Bad"										
Stations			Aerial Lines					At Grade Lines		
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.	
<u>Q16B. Noise inside home</u>										
Stratum 1 (1=closest)	40	29	13	70	80	21	84	45	31	16
2	24	7	13	67	54	18	38	54	12	7
3	16	20	5	32	-	22	30	11	11	0
4	20	0	0	36	-	0	17	40	0	0
6	-	-	-	14	-	-	-	-	-	-
<u>Q16C. Noise outside home</u>										
Stratum 1	61	29	23	85	80	16	68	55	31	16
2	34	21	13	67	40	18	38	54	8	0
3	21	20	0	37	-	38	30	44	11	0
4	20	20	9	36	-	0	17	40	10	0
6	-	-	-	10	-	-	-	-	-	-
<u>Q16D. Vibration inside home</u>										
Stratum 1	8	33	8	58	62	21	68	41	31	11
2	3	7	3	26	27	12	6	15	4	0
3	0	0	0	5	-	11	20	0	0	0
4	10	0	0	0	-	0	0	0	0	0
6	-	-	-	5	-	-	-	-	-	-
<u>Q16E. Vibration outside home</u>										
Stratum 1	16	33	13	60	67	21	37	36	17	16
2	3	7	3	22	15	18	6	8	4	0
3	5	0	0	11	-	33	20	11	6	0
4	10	0	10	9	-	0	0	20	0	0
6	-	-	-	5	-	-	-	-	-	-
Number of Respondents										
Stratum 1	(38)	(21)	(39)	(40)	(30)	(19)	(19)	(22)	(35)	(19)
2	(29)	(14)	(30)	(27)	(15)	(17)	(16)	(13)	(25)	(15)
3	(19)	(10)	(22)	(19)	-	(9)	(10)	(9)	(18)	(10)
4	(10)	(5)	(11)	(11)	-	(7)	(6)	(5)	(10)	(6)
6	-	-	-	(21)	-	-	-	-	-	-

cidence of reported impact had declined from 70 - 80 percent to 30 - 40 percent or less.

Among the station sites, only the first stratum at Concord showed a major effect (40 percent in the home, 61 percent outside); comparable El Cerrito Plaza and Daly City figures were 13 - 23 percent and 29 percent respectively, both declining even farther in Strata 3 and 4. Results for the two at-grade line sites were similarly low.

Behavioral change reported in response to this impact was minimal in all sites (Q16, data not shown). Most adjustment was found in the three aerial line sites with highest reported sound impact, and involved no more than about 20 percent of the respondents in any site. Virtually all reactions were passive, such as stopping conversation when trains passed.

Vibration

Prior Impact Assessments

Technical evaluations of vibration suggested that perceptible levels of vibration might be occurring along the aerial lines.¹ However, the perceptible vibration levels found were not considered intense enough to cause damage to structures. No conclusions were made as to whether the vibration was likely to be annoying.

Perception and Response

Substantial levels of adverse vibration effects were found only in and around the homes abutting some of BART's aerial line. In two of the five aerial sites, Albany East and West, well over half the Stratum 1 respondents complained about BART's vibration effects both inside and outside the house (Table V-4). In two of the three others (San Leandro and Hayward North) over a third of the first stratum responses were also negative. Smaller proportions (Concord 33 percent, all others 13 - 21 percent) were recorded nearest BART in all other sites. In all ten sites, the frequency of such negative evaluations declined quickly to negligible levels at greater distances.

No significant levels of behavioral change in response to BART's vibration were found.

¹Acoustic Impacts of BART, Op. cit. and Phase II Addenda to Direct Impacts, Op. cit.

ATMOSPHERIC IMPACTS

BART's perceived effects on local air quality and wind are generally negligible; however, many persons along BART's aerial lines feel that their television reception is being disturbed. Four survey items on various atmospheric impacts were included. Two (Q15K, 15U) dealt with local air quality and pollution; another with wind (Q15M), and one with TV interference (Q15N).

Prior Impact Assessments

Field measurements of carbon monoxide levels, plus application of other monitoring data and established relationships, indicated that air quality levels around BART stations are unlikely to be affected by BART-related traffic.¹ Similarly, there was no indication that either the BART structures or the open areas of its parking lots have led to any important changes in ground-effect winds, although some increases were possible.

One or two isolated instances of alleged TV interference were found in a review of BART's public complaint files from the first few years of operation. However, in subsequent discussions with BART electrical engineers and private cable TV technicians, as well as in other contacts with community spokesmen and residents, no further indications of any such problems were uncovered. Therefore although a question on this topic was included in the interview survey, no significant adverse response was anticipated.

Perceptions and Response

Adverse air pollution effects were reported by a significant proportion of respondents only in the Daly City station site. As shown in Table V-5 these effects were reported by about a quarter of the Daly City respondents. Elsewhere virtually no concern was reported, either in the site as a whole or even among the persons closest (Stratum 1) and thereby most likely to be affected.

There were virtually no reports of any BART effect on wind. Table V-5 makes this clear. This result is as anticipated.

Television reception interference is often noticed along BART's aerial lines, especially by those living closest to the tracks. This effect was substantial and remarkably consistent from site to site, as Table V-5 shows. In addition to the aerial sites, similar but less frequent effects were found at El Cerrito Plaza station (where many of the respondents' homes

¹TRW Inc., Impacts of BART on Air Quality: Interim Service Findings, BART Impact Program WP 20-4-76, Berkeley: Metropolitan Transportation Commission, 1976; Dr. Eugene Leong, "Air Quality," in Phase II Addenda to Direct Impacts, BART Impact Program WN-2-4-77, Berkeley: Metropolitan Transportation Commission, 1977 (in review).

about the aerial line as well as the station) and the Richmond line site (where BART is much closer to the adjacent homes than in the other at-grade line site). It appears that this effect is related to the passage of the train, particularly when on aerial trackways.

With this substantial frequency of reported adverse effect, it might be expected that residents would take some action -- either to protest or to avoid the problem, such as by installing a different antenna or subscribing to cable TV. However, no such behavioral responses were reported, either by the respondents themselves or by others such as BART public relations or cable TV representatives. Apparently, then, although the problem is widespread it is not severe enough that those affected are motivated to do anything at all about it.

Table V-5
ATMOSPHERIC IMPACTS BY SITE

	Percent of Respondents									
	Stations			Aerial Lines						At Grade Lines
	Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
<u>Q15K. Air pollution nearby</u>										
"Very" or "Somewhat Good"	3/8	8/25	10/5	4/4	19/5	4/2	4/2	4/8	5/1	2/2
"Very" or "Somewhat Bad"										
<u>Q15U. Air quality or smell</u>										
"Very" or "Somewhat Good"	2/7	10/18*	7/4	3/3	20/0	4/2	4/2	2/4	5/1	4/0
"Very" or "Somewhat Bad"										
<u>Q15M. Wind</u>										
"Very" or "Somewhat Good"	1/2	12/2	5/2	3/3	9/7	0/4	2/4	2/4	2/1	2/4
"Very" or "Somewhat Bad"										
<u>Q15N. Television reception</u>										
"Very" or "Somewhat Good"	0/7	10*/4	4/12*	0/26*	2/39*	0/25*	0/37*	2/25*	1/13*	2/8
"Very" or "Somewhat Bad"										
<u>Number of Respondents</u>	(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)

*Substantially higher in Stratum 1.

IMPACTS ON LAND AND WATER ECOLOGY

In general, no significant effects were reported on the "natural environment." One question (Q15T: effects on "trees and other nearby natural features") was included on this topic. No effects had been found in the staff's own impact assessment, and no response was expected.¹ Nonetheless the staff felt it important to insure that any even remotely possible effects, for example on flora such as street trees or backyard gardening, not be missed.

Reports of adverse effects were negligible in all sites. However, substantial minorities, particularly in the survey strata nearest BART, reported beneficial effects in two of the three station sites (Daly City and El Cerrito Plaza) and the three aerial line sites in which BART placed new trees and landscaping (the linear park in Albany and the Grove Street median strip in Oakland). At the Albany West site, which faced the linear park, fully 70 percent of the Stratum 1 respondents rated this BART effect favorably; Stratum 1 responses in the other four sites ranged from 24 percent to 41 percent favorable. Apparently, therefore, the BART landscaping was viewed as a substantial benefit.

NEIGHBORHOOD TRAVEL IMPACTS

High levels of adverse effects on traffic flow, safety from traffic accidents, parking near homes, and getting around in the neighborhood were reported at both terminal stations. Four interview items were included in this general topic area (Q15Q, R, S and X, as shown in Table V-6 and the Appendix). In contrast to the adverse effects at the two terminal stations, respondents in all other sites were overwhelmingly indifferent.

Prior Impact Assessments

Staff evaluations of traffic and parking conditions at BART stations produced the conclusion that the stations with large automobile access volumes -- and especially those with inadequate parking -- tend to have substantial problems.² Particularly at the stations in residential areas, where prior traffic levels were low, traffic accidents as well as volumes and speed appeared to increase because of BART-induced traffic. Both Concord and Daly City are such sites. Further, the traffic engineering measures taken in some locations to insure against such problems were not always effective.

¹De Leuw, Cather & Company, Impacts of BART on the Natural Environment, BART Impact Program TM 17-4-76, Berkeley: Metropolitan Transportation Commission, 1976.

²Gruen Associates Inc. and De Leuw, Cather & Company, Impacts of BART on the Social Environment, BART Impact Program TM 19-4-76, Berkeley: Metropolitan Transportation Commission, 1976.

Substantial parking overflows from the BART lots were found both at Daly City and to a lesser extent at Concord. On-street parking by BART patrons extended throughout the study sites at both stations. In contrast, the parking lot at the El Cerrito Plaza station had no overflow despite its smaller size, because of lower station patronage and auto access volumes. El Cerrito Plaza was also identified as a station with good traffic access; most of its parking lot faced a shopping center and was shielded from most residences by the station and line structures. In addition, very little BART-bound auto traffic found its way onto the surrounding residential streets because of the lot's placement with respect to arterial streets. For all these reasons no significant perceptions of parking or traffic impact were expected here.

At both at-grade line sites BART's right-of-way was fenced, blocking pedestrian traffic across a previously open railroad right-of-way. A pedestrian bridge was provided some time after BART's construction at both sites, in response to early problems with people (apparently children) cutting the BART fence to walk across the tracks. The problem stopped after provision of the walkways, but residents' satisfaction was unknown.

Perception and Response

Most residents at Daly City and Concord stations were unhappy with BART's effects on traffic congestion and parking; many also felt that traffic accident danger had increased. As Table V-6 displays, these levels of reported adverse effects were dramatically high, particularly in contrast to the negligible concern expressed in the other eight sites. These effects did not diminish significantly up to the full four-block depth in either site, indicating major effects on many people. These findings apparently reflect the effects of the overflow parking and substantial BART-related traffic at these two stations, in contrast to the observed lack of problems with parking and traffic at the other station site (El Cerrito Plaza). The lack of concern expressed by residents of the line sites is also reasonable, since no effects were expected away from the stations.

More respondents in the Daly City and Concord sites have changed their behavior in response to BART's parking problems than to any other BART impact (Daly City 42 percent, Concord 49 percent). About half of these responses were limited to passive adjustments (e.g., "not sleeping as much"); others were more active, such as "I tell my guests to park in the driveway (and we keep our car on the street)." This indicates a substantial "real" effect. About a third also reported behavioral changes in reaction to BART-related traffic congestion at these same two sites. Most of this was relatively passive (e.g., "drove and walked more carefully") and involved little effort or initiative, suggesting that the problem, despite widespread dissatisfaction, did not disrupt neighborhood life in a major way.

Many people at the same two stations felt that BART has resulted in their being blocked from getting to places in their neighborhood. Thirty percent of the respondents at Daly City and 51 percent of those at Concord reported adverse "barrier" effects (Table V-6). These proportions were about the same among Stratum 1 respondents as for the entire site, indicating that this problem does not diminish quickly with distance from the station. Since barrier effects in the strictest sense (a new physical barrier) do not really exist at either station as they do along

Table V-6
NEIGHBORHOOD TRAVEL IMPACTS BY SITE

Percent of Respondents*										
Stations			Aerial Lines					At Grade Lines		
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.	
Q15S. Traffic congestion										
"Very" or "Somewhat Good"	1/69	0/72	10/13	3/1	18/7	8/14	2/2	2/10	9/2	14/2
"Very" or "Somewhat Bad"										
Q15Q. Traffic accident safety										
"Very" or "Somewhat Good"	2/47	8/38	14/9	4/3	22/4	8/8	4/6	4/4	9/3	16/4
"Very" or "Somewhat Bad"										
Q15R. Parking										
"Very" or "Somewhat Good"	0/76	0/77	17/5	2/1	20/4	2/0	0/10	2/0	3/0	2/0
"Very" or "Somewhat Bad"										
Q15X. Barriers										
"Very" or "Somewhat Good"	1/51	8/30	7/1	2/1	20/2	10/8	4/4	6/2	6/16	0/20
"Very" or "Somewhat Bad"										
Number of Respondents	(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)

*Stratum 1 proportions were not substantially different from these in any site.

the at-grade line, it is most likely that these responses instead reflect the residents' extreme problems -- as already noted -- with parked cars blocking their driveways and congesting their streets.

Small but significant numbers of residents in the at-grade line sites felt that the BART line was a barrier to their local movement. Proportions of adverse reports were about 20 percent in both at-grade sites (Table V-6), in contrast with one to eight percent (negligible) in all aerial line sites.

These proportions were about the same for Stratum 1 and the full site in each case, suggesting that BART has to some degree severed the "neighborhood" as perceived by at least some of the residents several blocks away. Since both sites had pedestrian bridges over BART, this severance was not total; therefore more adverse effects should probably be expected in locations without this amenity, all else equal.

SOCIAL ENVIRONMENT IMPACTS

No major BART effects were reported on crime or residential composition, but the loss of privacy in backyards exposed to view from the BART trains was rated as adverse by many of those affected. Effects on the social environment which were tested by survey included privacy in backyards and inside homes (Q15I, J), crime at home and nearby (15P, P), changes in "the kinds of people who live around here" (Q15V), and construction or removal of nearby houses (Q15W). Respondents were given opportunities to volunteer any other effects, but none were reported by significant numbers of people.

Privacy

Prior Impact Assessments

Based on observation both from the BART trains and on the ground, the study staff concluded in Phase I that many private yards were exposed to view from the trains.¹ This was particularly so for yards of homes at which the backyards adjoined the BART aerial line rights-of-way, both because of their elevation (15 - 25 feet) and their closeness (as little as 5 - 10 feet). No significant effects were expected farther from the tracks, however.

Many windows were also newly exposed to view. However, the staff concluded that in-home privacy was probably unaffected because of factors such as the train's speed, daytime window reflections, and most people's habit of nighttime draping of windows throughout the home.

¹ Impacts of BART on the Social Environment, Ibid.

Perception and Response

Loss of backyard privacy is widely felt to be an adverse effect by residents whose backyards adjoin the BART aerial line right-of-way. In every line site with backyards adjoining BART, a large proportion of those affected felt the effect to be "somewhat bad" or "very bad" (Table V-7). This was particularly true in the aerial sites so affected, which had been expected because of the high vantage point of the train riders and the extreme closeness of the tracks to the yards. To a lesser extent a problem was also perceived by residents nearest the at-grade lines. However, very few respondents in any sites reported any behavioral changes, indicating that the problem was probably not severe. Most of the few behavioral changes reported were passive (e.g., closing curtains at night) rather than active (e.g., building a high fence or discontinuing sunbathing, etc.).

As Table V-7 indicates, BART's perceived effects on privacy inside the home, in contrast to in the yard, were not always negligible but small. Moreover, they were about as likely to be reported farther from the tracks as very near. This suggests that personal factors present to some degree in any random population sample (such as fear of strangers, desire for extreme privacy, etc.) may be largely responsible for the small effects reported.

Crime

Prior Impact Assessments

In Phase I, BART's effects on crime around stations were concluded to be minimal or negligible.¹ Increased theft of automobiles and auto burglary, primarily directed at BART patrons, was found at several stations. The Daly City study site was one of these. However, no evidence was found of similar problems in any of the other case study station sites or anywhere along the BART trackways. In addition, no possibly BART-related increases in violent crimes were reported in any of the residential areas along the system.

Perception and Response

BART's reported effects on local crime have been minimal in all cases except for some limited concerns at the Concord station site. At all seven line sites, BART's perceived effects on crime were insignificant except for a beneficial effect reported by 20 percent of the Albany West residents. No meaningful interpretation of this isolated case is apparent, apart from the possibility that the well-lighted BART linear park (which can be seen from most of the homes in the site) increases feelings of security. However, crime rates in this area were always low and have not changed appreciably since BART.

¹BART's Impacts on the Social Environment, Ibid.

Table V-7
SOCIAL-ENVIRONMENT IMPACTS BY SITE

Percent of Respondents												
Stations			Aerial Lines					At Grade Lines				
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.			
Q15I. Backyard privacy												
"Very" or "Somewhat Good"/ "Very" or "Somewhat Bad"			1/12	10/8	5/4	0/23*	5/18	2/4	0/20*	0/29*	2/10*	4/10*
Q15J. Privacy inside												
"Very" or "Somewhat Good"/ "Very" or "Somewhat Bad"			3/16	12/8	5/2	1/10	7/18	2/8	0/18	0/11	3/5	4/4
Q15O. Crime at home												
"Very" or "Somewhat Good"/ "Very" or "Somewhat Bad"			3/18*	22/12	14/4	3/3	20/9	2/2	0/6	2/2	5/0	12/2
Q15P. Crime nearby												
"Very" or "Somewhat Good"/ "Very" or "Somewhat Bad"			4/24*	22/12	13/8	3/3	18/9	6/0	0/8	2/2	6/0	12/2
Q15V. Changes in residents												
"Very" or "Somewhat Good"/ "Very" or "Somewhat Bad"			10/10	12/2	11/3	3/2	9/0	8/0	0/0	6/6	5/1	2/0
Q15W. Housing changes												
"Very" or "Somewhat Good"/ "Very" or "Somewhat Bad"			1/51	8/30	7/1	2/1	20/2	10/8	4/4	6/2	6/16	0/20
Number of Respondents			(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)

*Substantially higher in Stratum 1.

Among the station sites, the few adverse reactions reported were outweighed by higher levels of reported beneficial impact. This was true even at Daly City, where auto theft has in fact apparently risen since BART; this is probably because the victims tend to be BART patrons rather than neighborhood residents. Concord is a surprise; substantial proportions of the residents there, particularly those living just across the street from the station (Table V-7), reported bad effects of BART on crime both at home and nearby. Since local police have indicated no knowledge of any significant increases in crime here, the reasons for such responses may involve either personal factors or a more generalized disaffection with BART. This is supported by data presented in the previous chapter, which show that BART's overall effects are rated more negatively here (26 percent unhappy with BART overall, 21 percent unhappy with its local effects) than at either of the other two station sites. This is perhaps due to frustration over the site's real problem with BART-related parked cars and traffic.

Despite these concerns, very few residents reported any resulting changes in their regular behavior patterns, even at Concord. The few responses found (under 20 percent) were predominantly passive, such as increased caution in driving and walking.

Neighborhood Composition

Prior Impact Assessments

No indications of change in socio-economic characteristics of neighborhood residents were found in any of the study sites (or for the entire system's adjacent neighborhoods). Although data for such assessments are generally weak and infrequently collected, neither the available statistics nor the opinions of local officials provided any support for any such effects.

The project included a general assessment of recent changes in land use in areas along BART¹; this topic is to be investigated in more detail in a later BART Impact Program study, the Land Use and Urban Development Project. This study's survey results on such effects are for use in that project. However, both the land use assessment and informal observations made by the survey study's staff suggest that apart from the initial demolitions required by BART's own construction, there has been virtually no housing removal or construction, and no change in neighborhood upkeep or housing character in the survey sites.

¹Gruen Associates, Inc., Indirect Environmental Impacts, BART Impact Program TM-24-4-77, Berkeley: Metropolitan Transportation Commission, 1977 (in review).

Perceptions and Response

Perceived changes in neighborhood population composition were negligible in all sites. As shown in Table V-7, proportions of those citing changes were very small. It is of interest that these reported effects, however small, are either more positive than negative or neutral; these small but consistent results do provide at least a tentative indication that BART's effect is not disruptive.

Substantial adverse effects of BART on removal or construction of homes were reported in the Concord and Daly City sites. Table V-7 shows these adverse-effect reports to be 30 percent for Daly City and 51 percent for Concord, in contrast to one to eight percent (insignificant) at the El Cerrito Plaza station and along all five aerial line sites. Positive evaluations of these same effects are slightly higher (four to twenty percent) in most of these same sites, tentatively indicating a small perceived benefit. The reasons for the adverse effects at the two station sites are not clear, since little if any housing removal or construction has in fact occurred since BART's inauguration. It is most likely that these negative evaluations are in response to the early removal of (many) homes for BART's parking lot and station.

A similar but less frequent adverse effect is reported for both the at-grade line sites (16 percent - 20 percent). Although these frequencies are clearly higher than those found in all the aerial line sites, the cause of such feelings is obscure. There are no indications of any such actual effects, and in both cases even the BART construction was wholly on existing railroad rights-of-way and apparently involved no loss of residences. Moreover, this response pattern is inconsistent with most found for other impact evaluations (generally more positive) in these same sites, so it is unlikely that the respondents are merely using the question as a chance to vent broader frustrations with BART. We offer no hypotheses, but only note that even these frequencies of adverse responses constitute only small minorities of the respondents in each site.

Generally no behavioral changes were found in response to these reported effects.

VISUAL IMPACTS

BART's visual effects are rated as beneficial or neutral by the great majority in all sites although with some negative feelings about view and shadow effects along aerial lines abutting backyards. Five survey questions dealt with various aspects of the general topic of visual impact. Two considered view, both from inside the house (Q15A) and in the backyard (Q15F). A third focused on BART's night lighting (Q15G), a fourth on overall neighborhood appearance (Q15H), and the last on shadow effects (Q15L). The following paragraphs treat each of these individually.

Neighborhood Appearance

Prior Impact Assessments

The major conclusion of the Phase I assessments of visual impacts was that BART's large structures and parking lots have created (adverse) visual conflicts with their residential surroundings.¹ This conclusion was based on the premise that any intrusion of structures so different in size and design is damaging to the visual quality of the typically small scale and personal character of low-density residential areas. This premise implies a distinction between BART's own appearance (apart from its setting) and its effects on overall neighborhood appearance. A specific intent of the survey was to test the acceptability of this subjective "premise" to the residents who must look at and live with the BART architecture.

Perception and Response

In most sites the majority of respondents are indifferent to BART's effect on neighborhood appearance. Responses neither positive nor negative ("no effect" or "half and half") range from 42 percent at Albany West to 88 percent at Hayward South. Further, in eight of the ten sites this indifference persists even among those living nearest BART (Table V-8). This shows that the visual effect of BART's architecture on the neighborhood is not of particular concern to most nearby residents, and thereby suggests that they do not share the study staff's belief in the adverse effect of BART's visual contrast with its residential surroundings. It seems probable, then, that most of these residents find the BART structures both aesthetically acceptable in themselves, even if not particularly beneficial, as well as environmentally unobtrusive.

The most frequent reports of adverse effects on neighborhood appearance are from residents of the Concord station site and the aerial line sites without landscaping. The Concord response continues that site's consistently negative evaluation of BART's effects. Reasons for this specific response are not clear. One might hypothesize that residents are reacting to the "appearance" of the many autos of BART patrons parked along their streets; but Daly City respondents, subjected to the same effect, are much more positive than negative about BART's effects on appearance. Similarly, one might suppose that the station's visual contrast is the cause; but respondents in El Cerrito have a similar view of a nearly identical station -- and are of higher income and more established in their neighborhood besides, which should make them even more sensitive -- but are also enthusiastic about BART's effects on neighborhood appearance. The only reasonable conclusion available at this stage of the analysis is that the Concord residents are displaying a more general frustration with BART.

¹Gruen Associates, Inc., Impacts of BART on Visual Quality, BART Impact Program TM 18-4-76, Berkeley: Metropolitan Transportation Commission, 1976.

Table V-8
VISUAL IMPACTS BY SITE

Percent of Respondents									
Stations			Aerial Lines					At Grade Lines	
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
$2\frac{2}{9}^*$	$20\frac{2}{8}$	$13\frac{1}{10}$	$1\frac{1}{26}^*$	$14\frac{1}{30}$	$13\frac{1}{15}$	$2\frac{2}{22}^*$	$6\frac{1}{18}^*$	$7\frac{1}{11}^*$	$0\frac{1}{4}$
$0\frac{1}{6}$	$6\frac{1}{8}$	$4\frac{1}{7}$	$1\frac{1}{20}^*$	$11\frac{1}{14}$	$8\frac{1}{4}$	$0\frac{1}{16}$	$4\frac{1}{28}^*$	$2\frac{1}{10}^*$	$2\frac{1}{4}$
$19\frac{1}{5}^*$	$50\frac{1}{2}^*$	$32\frac{1}{6}^*$	$15\frac{1}{4}^*$	$56\frac{1}{4}^*$	$14\frac{1}{4}$	$4\frac{1}{6}$	$2\frac{1}{8}$	$8\frac{1}{2}$	$6\frac{1}{2}$
$11\frac{1}{25}$	$40\frac{1}{16}$	$36\frac{1}{4}^*$	$14\frac{1}{15}$	$40\frac{1}{18}$	$40\frac{1}{12}$	$4\frac{1}{20}^*$	$10\frac{1}{23}$	$10\frac{1}{6}$	$10\frac{1}{2}$
$1\frac{1}{5}$	$6\frac{1}{0}$	$5\frac{1}{4}$	$1\frac{1}{14}^*$	$5\frac{1}{16}$	$2\frac{1}{12}^*$	$2\frac{1}{16}^*$	$4\frac{1}{29}^*$	$3\frac{1}{1}$	$0\frac{1}{0}$
(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)

*Substantially higher in Stratum 1.

A large majority of respondents in both at-grade sites and three of the five aerial sites are indifferent to this impact. However, after Concord, respondents in the San Leandro and Hayward North aerial line sites are most likely to be unhappy with BART's effects on neighborhood appearance, in marked contrast to those in Albany West and Oakland. A tentative conclusion is that the total lack of right-of-way landscaping or other amenities in the former two sites may be responsible, contrasting with the grass and trees of the highly visible Albany linear park and the parkway effect of the landscaped Grove Street median strip under BART at the Oakland site.

View

Prior Impact Assessments

In keeping with the staff's earlier negative assessment of BART's effects on neighborhood appearance, it was anticipated that persons living closest to BART -- and thereby most able to see it from the home -- would be strongest in their disapproval. It was expected that this would be so especially for residents whose homes adjoined BART's aerial lines and station parking lots. It was also anticipated that the presence of landscaping and particularly the Albany linear park, would offset such adverse effects such that the net resulting evaluation would be more or less neutral.

Perception and Response

Although the majority of respondents in all sites were indifferent to BART's effects on the view from their homes, those whose backyards adjoined the BART line tended to consider its effects to be more adverse. Both for the view from the backyard (Q15F) and from inside the home (Q15A), respondents indifferent to BART's effects ranged from 56 percent to 96 percent of all those interviewed (Table V-B). Positive responses were insignificant in number in most sites and small in others.

Reports of adverse effects on the view both from inside and in the yard were also few, except in the three sites with the nearest backyards abutting BART at very close range (Albany East, San Leandro, and Richmond¹). Here virtually all negative responses were in the first stratum, where they ranged from 23 percent (Richmond) to 48 percent (Albany East) of the stratum subsample (data not shown). Forty-seven percent of the first stratum respondents in the Hayward North line site, where the BART aerial structure is just across a very narrow street in an unlandscaped (bare ground) tract, also reported an adverse effect on the view from inside their homes. These results indicate that those who are most likely to see BART's lines at very close range are likely to be unhappy about what they see. Although virtually no behavioral changes were reported by these respondents, it would be difficult to envision any reasonable changes which would

¹The other at-grade site, Hayward South, also has backyards abutting BART property but at greater distance and blocked by high fences.

help, short of moving away. Fences, for example, could hardly be built high enough to block the view of the aerial track. In any event, neither any such extreme actions nor very many lesser ones were reported, probably indicating that the effects are not serious enough to warrant taking the actions which are possible.

Lighting

Prior Impact Assessments

It was anticipated that BART's very bright parking lot lights would be viewed as an adverse impact on the surrounding homes and yards.¹ The lights are typically unshaded and cast light substantially beyond the boundaries of the lots.

Perception and Response

Contrary to expectation, most residents were indifferent to the BART lighting and substantial numbers viewed it as a benefit. At the Daly City and El Cerrito Plaza station sites, a large majority of the respondents in Stratum 1 felt that the lighting has a positive effect on them. Concord residents are more negative; however, even in the first stratum here more were positive than negative.

In addition to the station sites, large proportions of the first stratum respondents in the Albany East (33 percent) and West (73 percent) sites viewed BART lighting as a benefit to them. This unexpected result apparently referred to the lighting in the linear park adjoining both sites, which, although not intensive, provides a continuously lighted sidewalk for its full two-mile length in contrast to the infrequent pools of light cast by the local street lighting. Both here and at the station sites, residents are probably relating the light to protection against crime, as well as safety from accident while walking.

Shadows

Prior Impact Assessments

The Phase I Visual Quality study evaluated the degree to which BART's aerial structures cast shadows on adjacent homes and yards, considering factors such as structure height, separation distance, and orientation to the sun. It was concluded that much of the aerial trackway did cast shadows on homes and yards for part of each day. It was anticipated that these shadows would be considered an adverse effect by those affected.

¹Impacts of BART on Visual Quality, Ibid.

Perception and Response

Between a quarter and a half of the residents nearest BART's aerial tracks judged the structure's shadow effects to be adverse. In four of the five aerial line sites, negative responses of first stratum respondents ranged from 24 percent to 50 percent, with the remainder indifferent. In the fifth aerial site, Albany West, the nearest homes are across a wide street and have no shadows from BART except briefly in the early morning. These results indicate that shadows are a substantial problem where the aerial structures are sited very close to homes and yards.

THE LINEAR PARK

The BART "linear park"¹ influences a variety of environmental dimensions such as view, natural ecology, safety, and security, and provides a general recreational and aesthetic amenity to the neighborhood. In the Phase I study the staff conjectured that these effects might be positive enough to offset some of the adverse impacts of the aerial line. Because of this complexity of effects and its unique policy implications, the park is treated as a separate topic in this brief section. The issue of its success in counteracting adverse BART impacts of the parallel aerial line is treated in a later chapter.

The linear park is almost unanimously viewed as a benefit, and is used by most nearby households. As shown in Table V-9, about 90 percent of all respondents in both sites abutting the linear park believe it to have a "good" or "very good" effect; the majority of these judge the effect as "very good." These results hold for all strata, including those as distant as six blocks (data not given). Use of the park is also extensive; even as far away as six blocks, half the respondents reported that their households make use of the facility. These results clearly show that the park is well received. The effectiveness of its role in offsetting perceptions of other adverse effects such as train noise remains to be analyzed in a later chapter (Chapter VII).

¹A 2.9-mile strip of land beneath BART's aerial tracks through Albany and El Cerrito, heavily landscaped and provided with lighting, walks, playgrounds and conversation areas.

Table V-9

RESPONSE TO THE ALBANY LINEAR PARK

Q17A. Effect on neighborhood

"Very Good"/"Fairly Good"

Q17B. Use by household

"Often"/"Occasionally"

Number of Respondents

Study Site	
<u>Albany East</u>	<u>Albany West</u>
48/43	56/33
19/47	18/53
(118)	(43)

VI. BART'S EFFECTS AWAY FROM HOME

In this chapter we use data from the ten-site survey to provide an indication of BART's perceived environmental impacts outside the immediate residential environment. The survey included items dealing with general knowledge and awareness of the system (Q22) as well as awareness and evaluation of a variety of specific BART features both during travel in the region (Q23) and while at work or other regular activities away from home (Q24).

Several issues were behind this part of the study's analysis. As a result of the Phase I study of BART's visual impacts, it was conjectured that the system's 71 miles of trackway and its well-publicized map configuration within the region might help to give Bay Area residents a clearer perception of the region and the relationship of its parts. A test of this hypothesis was desired.

In addition, since the remainder of the survey focuses tightly on the residential environment, it was desired to obtain at least some general indications of how BART's effects away from home are perceived. It was expected that these effects would be minimal or, if noticed, positively judged. Of particular interest was the respondents' evaluation of the street and sidewalk improvements made in conjunction with BART's construction in downtown San Francisco, Oakland, and Berkeley. In Phase I these were judged by the study staff as major beneficial effects; it was desired to find whether the general populace agreed or even noticed.

There are limitations inherent in this analysis which should be underscored in order to avoid misinterpretations. Though we attempt to examine BART's "regional" effects, we do not have a representative sample of Bay Area residents, so our data on overall awareness of BART are only suggestive. Further, our sites do not provide samples which are strictly representative of all individuals living along the BART line, since the sites were chosen with other concerns in mind. Also, our data on traveling and routine daily activities, in relation to awareness of BART, are distorted because the individuals surveyed exhibit different travel patterns; thus in their responses they are assessing BART's effects at different yet unspecified places.

GENERAL AWARENESS AND RESPONSE

There is a high awareness of BART as a regional element in the Bay Area. From 69 percent (Richmond) to 90 percent (Oakland) of all of the respondents reported that BART was a noticeable part of the landscape outside their own neighborhood (Table VI-1).

ble VI-1
GENERAL PERCEPTIONS AND EVALUATIONS OF BART AWAY FROM HOME

2D. Notice BART in Bay Area

"A lot"/"A little"

2E. BART's appearance in
gion

"Very Good"/
"Bad" or "Very Bad"

Number of Respondents

Percent of Respondents									
Stations			Aerial Lines					At Grade Lines	
Concord	Daly City	El Cerrito	Albany E.	Albany W.	Oakland	Hayward N.	San Leandro	Richmond	Hayward S.
46/ ₄₃	48/ ₄₀	32/ ₅₄	34/ ₅₀	51/ ₃₆	50/ ₄₀	28/ ₄₇	43/ ₃₇	28/ ₄₁	42/ ₄₈
44/ ₉	50/ ₈	41/ ₄	36/ ₇	38/ ₁₃	56/ ₆	35/ ₁₈	45/ ₁₀	61/ ₃	47/ ₈
(96)	(50)	(103)	(118)	(43)	(52)	(51)	(49)	(88)	(50)

BART's overall appearance in the region was rated favorably. In total, only eight percent of the respondents said that BART looked fairly bad or very bad, meaning that the large majority believed the system's appearance was good or very good. This was true for almost every site: the range of "bad" evaluations was from 18 percent (Hayward-Western Avenue) to three percent (Richmond), with most sites being a few percentage points from eight percent. In contrast, from 35 percent to 61 percent of the respondents in each site judged BART's regional appearance as "very good."

The consistency of these evaluations across sites seems to suggest that, despite differences in local effects, both awareness of BART and a positive evaluation of its "looks" in the Bay Area are substantial.

BART'S EFFECTS ON PERCEPTION OF THE REGION

BART seems to have increased residents' knowledge of the Bay Area only slightly. About one in five of our total sample indicated that they were "more aware" of different parts of the region because of BART's influence.

Variations among sites were very small (15 percent - 29 percent) and each of our sampling points along the BART line conformed quite well to this general finding.

Knowledge of BART station locations is generally quite high, but many cannot correctly identify distant stations or distinguish fictitious ones. Ten "possible" station sites were mentioned; four of which were fictitious (San Jose, Vallejo, Livermore, Palo Alto); four terminal stations (Concord, Richmond, Daly City, Fremont), and two regular East Bay stations (Berkeley, Hayward). Overall, knowledge of existing terminal stations was high: about 90 percent were aware of the Fremont, Concord, and Richmond stations, while 80 percent were aware of the Daly City station. This discrepancy could be due to the heavy weight of our sample towards the East Bay, distant from Daly City. Knowledge of the two non-terminal stations was around 80 percent also. Correct identifications of the fictitious stations were high but slightly less so, ranging between approximately 68 percent for Livermore and Palo Alto, 71 percent for San Jose, and 76 percent for Vallejo). However, this latter phenomenon was caused less by wrong answers than by an increase in "don't knows," indicating a lack of information regarding BART's limitations rather than misinformation. Review of responses at each site separately also indicated a trend for there to be fewer correct identifications of fictitious stations.

One other interesting finding is the distribution of differences among sites in correct identification of the "real" stations. It seems that individuals living on one line, and perhaps exhibiting a certain kind of trip pattern, may be less aware of distant stations on other lines. For example, many of the Daly City, Concord, and South East Bay respondents were not sure about the existence of the Berkeley BART station. Similarly, many Richmond and El Cerrito residents seemed uncertain about BART stations in Hayward. Whether this is an indication of different travel patterns (assuming a large influence of BART users) or knowledge of the system, it seems that awareness may be partially a function of location in the region; further, lack of knowledge in some areas could be restricting the use of BART for certain kinds of trips.

SPECIFIC BART FEATURES

To select qualified respondents for judgment of BART's specific effects away from home, questions were asked concerning how often people noticed BART -- both when traveling in the Bay Area and when going about routine activities in places away from home. When traveling, more than two-thirds of all respondents said they noticed BART at least once a week. This was taken as a sufficient degree of exposure. However, only one-third of the total sample said they noticed BART at least once a week during their normal activities away from home. Thus, while BART seems to be a "fixture" in the Bay Area's landscape, it is apparently not an intrusive factor in the normal course of conducting business away from home at least for those

respondents. This generalization was supported when examining the data by separate sites.

BART attributes most often noticed by residents when away from home and particularly appreciated are the appearance of the stations and trains; train noise and cars parking around stations are most actively disliked. Pooling all respondents who reported that they noticed BART at least once a month while traveling, the specific BART features "often" noticed by the most respondents are the appearance of the trains (49 percent), elevated track (46 percent), and the stations (44 percent) -- see Table VI-2. Since these features are particularly widespread and identifiable throughout the region, these results are not surprising. Perhaps of greater significance is the fact that train noise, an impact often thought to be severe, was noticed "often" by far fewer respondents (27 percent) than those reporting noticing the other BART features just cited.

Table VI-2
BART ATTRIBUTES NOTICED DURING TRAVEL BY CAR OR BUS (Q23B)

	Proportion of Respondents ¹		
	Often Notice	Sometimes Notice	Rarely or Never Notice
1 - Station appearance	44%	38%	18%
2 - Directional signs	42	30	28
3 - Train appearance	49	34	17
4 - Aerial tracks	46	36	18
5 - Train noise	27	26	47
6 - Traffic at stations	18	25	57
7 - Parked cars	38	25	37
8 - Station lighting	26	26	48
9 - Downtown streets	31	24	45
10- Other	9	7	84

¹Only those 486 respondents who reported noticing something about BART at least once a week while traveling are included; the remaining 216 are omitted.

The residents surveyed were also asked whether they were either particularly happy or unhappy about any of these (or other) BART features (Q23C, 23D). Both pooled and site-specific results indicate that among the things most often noticed away from home, the appearance of BART stations and trains are most highly and consistently valued. Proportions of respondents in each site who were asked these questions and said they were especially happy ranged from 17 percent to 59 percent (most sites over 30 percent) for station appearance and from 22 percent to 65 percent for train appearance. Very few were unhappy with these features.

Respondents were most often "particularly unhappy" with BART train noise and cars parking around stations. These negative responses averaged around 30 percent to 35 percent with responses pooled, although variations among sites were large. Virtually no respondents chose these attributes as ones with which they were "particularly happy."

Changes in Downtown Areas

In all, it appears that BART's improvements to downtown streetscapes are noticed but not widely, and are approved of but not highly valued by most. As noted earlier, the response to the substantial changes in the streets and sidewalks of downtown areas (Berkeley, Oakland, San Francisco), made when BART was introduced to the Bay Area was of particular interest. These alterations were noticed in the course of our respondents' travels, though, as described in the preceding paragraph, not as often as are some other BART features. Only the Daly City and Oakland respondents, in substantial numbers (i.e., approximately 50 percent or more), notice these changes "often" in either their routine travels or while traveling in the Bay Area. In the majority of sites, only one-third or fewer of the respondents notice these downtown changes "often;" this is particularly so among respondents in the Concord and Southern East Bay sites.

The respondents who noticed these downtown changes "often" were neither clearly positive or negative in their evaluations of them. In most sites, no one was unhappy with these changes, and across all sites only a handful were. However, reports involving "happiness" with the alterations were small in number also: in no site was it the factor for which the largest percentage of people were "happy" about, and in most cases the percentages (and sample sizes) were small.



VII. BART ATTRIBUTES AS CAUSES OF IMPACTS

Preceding chapters have identified the extent to which residents of selected sites notice BART and how they feel about its general and specific aspects. We now turn to comparisons of particular sites that may identify some of the reasons for variation in these responses from site to site. The present chapter focuses on the attributes of BART that might account for these differences: trackway configuration, presence of linear parks, train frequency, station parking facility and traffic pattern. Because these attributes are frequently matters of policy choice, their links with impact are of central interest to the study. Later chapters will examine the effects of two other factors which may modify BART's impact: environmental factors and population characteristics.

As outlined earlier, the initial selection of sites for intensive study, anticipating analyses of this type, included where possible sites that were similar in all respects except for a particular configuration of the BART line: one had a station, another did not; one had an aerial line, another at-grade; and so on.

A second objective of this analysis is to estimate the effect of several BART attributes occurring together, particularly as contributors to an overall image of perceived beneficial and adverse effects. This allows a test of the proposition that response to a specific impact is influenced by a "balance" of impacts. Thus if the presence of an "accessory benefit" such as a linear park makes BART's adverse effects on the respondent less objectionable, a policy of providing such accessory benefits is supported.

Relationships between BART attributes and their perceived effects are identified in this chapter by two methods of analysis. First, perceptions of BART's effects are compared among sites with similar characteristics except for the BART attribute being investigated. Second, respondents' own statements regarding the source of impacts they perceive are examined. These statements are a substantial source of information about the sources of impact in addition to findings resulting from comparisons of sites, for two reasons: almost all persons with strong feelings about BART's specific impacts were found to be able to identify specific attributes of BART which they believed to be the causes of those impacts and perceived impact was generally attributed by respondents to a specific BART feature. That is, of persons identifying the sources of impact, at least 75 percent identified only one BART-related cause for each impact of importance to them. (Data not shown.)

After a brief review of the relationship between the general BART configuration (station, aerial line, at-grade line) and the respondents' summary response to BART's impact, we discuss the impacts of specific BART attributes at line sites, then at station sites. Attributes of the former include trackway configuration, presence of linear park and train frequency, while attributes of the latter include parking configuration and the pattern of automobile traffic.

GENERAL CONFIGURATION OF BART: STATION, AERIAL LINE OR AT-GRADE LINE

Before turning to more detailed analyses, a brief review of the general response to BART as reported in Chapter IV lends perspective to the following discussion. Since expressions of displeasure with BART are often more discriminating than expressions of general satisfaction with the system, we review the percent unhappy with BART overall and with its effects in and around the home for the three types of site groups as presented earlier in Table IV-1 (not repeated here in tabular form).

The general pattern of response is clear: respondents who live at a site where BART is an aerial line are consistently less satisfied with BART overall and with its effects in and around their homes. From one-quarter to one-third (from 25 percent to 32 percent) of the sampled residents of aerial sites were "unhappy" about BART's overall impact (Q19B), a level of dissatisfaction reached at only two of the five non-aerial sites: at the Concord station, where 26 percent were "unhappy," and the Hayward-South at-grade line, where 24 percent were "unhappy."

Similar results were obtained with regard to dissatisfaction with the effects of BART in and around the home (Q19A). Except for the Oakland aerial site, where 12 percent were "unhappy," from 22 percent to 32 percent of the respondents at aerial sites were displeased with this aspect of BART's impact, as compared with 16 percent or fewer of the respondents at each of the other sites except for the Concord station, where 21 percent were "unhappy."

These generally higher levels of displeasure with BART at aerial sites are also found in comparisons restricted to the first sampling stratum. Except for the Oakland aerial site, displeasure with BART in general and with its effects in and around the home is higher at each of the aerial sites than at any other sites. (Data not shown.)

LINE SITES

Turning now to more specific aspects of BART's impacts, we find that the response to BART at line sites appears to be influenced by trackway configuration and the presence of linear parks but not by train frequency. For example, persons living near aerial lines are somewhat less satisfied with BART than persons residing near at-grade track. In terms of specific impacts, residents living near aerial lines are more often unhappy about BART's impacts on acoustics, neighborhood appearance and view, privacy and radio/TV reception than residents of at-grade sites. And although persons residing next to aerial lines with a linear park view some of BART's effects (those related to park benefits such as increased lighting and improved landscaping) more favorably than do residents living in similar conditions near the aerial line without the linear park, their overall attitude toward BART is no more favorable in spite of the presence of the linear park. Details of these findings follow.

Track Configuration

The study's earlier analysis of pre-BART survey data indicated that in general, people living near aerial sites were less happy with BART than persons living near at-grade lines.

Data from the current survey suggest a similar picture. A contrast between two sites, one at-grade and the other aerial -- sites that in other respects closely resemble each other -- adds weight to the conclusion that at-grade lines are somewhat better received than aerial ones. From the pattern of residence in relation to BART, the Richmond at-grade line and the San Leandro aerial line are similar: the general pattern of residential spacing in relation to BART is about the same, and at both sites houses in the first stratum back up to BART. A comparison of these two sites with regard to the general level of dissatisfaction with BART overall and with its effects in and around the home shows (see Table VII-1) the somewhat greater displeasure with BART at the aerial sites. Responses from the first sampling stratum only, also shown in Table VII-1, show the same pattern.

With some exceptions, we emphasize the expression of displeasure ('unhappiness') rather than pleasure ('happiness') in this analysis because we have frequently noted that the former is a more discriminating response. That is well illustrated in Table VII-1, where examination only of the percent "happy" would lead to the conclusion that there was essentially no difference between San Leandro and Richmond in the resident's response to BART.

With regard to specific impacts, differences between aerial linesites and at-grade sites were most marked for acoustic impacts, visual impacts, privacy and radio/TV reception. This confirms Phase I direct impact measurements in which BART train sound and vibration were found to be higher at aerial than at at-grade sites. When comparing sites with similar characteristics except for trackway configuration the differences are clear (see Table VII-2). In addition, most persons identifying these impacts in qualitative responses attributed them to their obvious source: BART trains (data not shown).

It also appears that the subjective perception of unpleasant noise and vibration, which occurs less frequently in at-grade than in aerial line sites, occurs over a greater distance from the BART line in aerial sites as compared to at-grade sites. This conclusion follows from examination of the several sets of consistent differences that appear in Table VII-2.

First, there is, as noted, consistently greater displeasure at the aerial site, for both noise and vibration impacts, over the whole site as well as among respondents living only in the first stratum. Second, within each site there is consistently greater displeasure with these impacts in that

first stratum than in the site as a whole. This difference is present for both types of impact, and regardless of whether the respondent is assessing the impact as perceived from within his home or from outside. Third, this last difference is more pronounced at the at-grade than at the aerial site, which leads to the conclusion stated above. The consistency of these patterns over the several possible comparisons lends validity to the conclusion.

In a similar fashion, residents of aerial sites expressed more displeasure than residents of at-grade sites about the intrusiveness of the BART structure in terms of its visual appearance, invasion of privacy, and effect on

Table VII-1

OVERALL EVALUATION OF BART AT AN AERIAL LINE SITE
AND A COMPARABLE AT-GRADE SITE

	Percent of Respondents	
	Aerial San Leandro	At-Grade Richmond
WHOLE SITE		
<u>Q19B. Overall feelings about BART</u>		
"Happy"/"Unhappy"	66/32	65/19
<u>Q19A. Feelings about BART's effects in/around home</u>		
"Happy"/"Unhappy"	47/22	49/10
<u>Number of Respondents</u>	(49)	(88)
FIRST STRATUM		
<u>Q19B. Overall feelings about BART</u>		
"Happy"/"Unhappy"	73/23	71/17
<u>Q19A. Feelings about BART's effects in/around home</u>		
"Happy"/"Unhappy"	36/41	51/23
<u>Number of Respondents</u>	(22)	(35)

radio and television reception. As before, this comparison is most clearly seen by comparing the San Leandro aerial site with the Richmond at-grade site, as is done in Table VII-3. For these visual impacts, which are far greater for residents directly adjacent to BART, we present responses for the first sampling stratum only.

The evaluations in Table VII-3 show a consistent pattern of greater displeasure at the aerial site over all of these impacts. For most impacts nearly twice as many aerial site residents appear unhappy as at-grade site residents. The exception is "privacy inside the home," the visual impact which generated the least displeasure in any case. Although displeasure at the aerial site regarding that impact was also greater than for the at-grade site, the difference is insignificant.

Although these analyses show that trains running on elevated structures are likely to affect negatively the perceived quality of life of residents living next to the structure, it is important to recall that

Table VII-2
EVALUATION OF SOUND AND VIBRATION IMPACTS AT AN
AERIAL LINE SITE AND A COMPARABLE AT-GRADE SITE

	Percent of Respondents "Unhappy"	
	Aerial San Leandro	At-Grade Richmond
SOUND IMPACT		
<u>Noise inside home</u>		
Whole site	41	18
First stratum	45	31
<u>Noise outside home</u>		
Whole site	51	18
First stratum	55	31
VIBRATION IMPACT		
<u>Vibration inside home</u>		
Whole site	22	14
First stratum	41	31
<u>Vibration outside home</u>		
Whole site	23	9
First stratum	36	17
<u>Number of respondents</u>		
Whole site	(49)	(88)
First stratum	(22)	(35)

previous analyses (Chapters IV and V) show this disruption to be not so severe as to cause many residents to move from the area or, apparently, change their behavior patterns in other significant ways.

Table VII-3
EVALUATION OF VISUAL IMPACTS AT AN AERIAL LINE SITE
AND A COMPARABLE AT-GRADE SITE (FIRST STRATUM ONLY)

	Percent of "Unhappy" First Stratum Respondents	
	Aerial San Leandro	At-Grade Richmond
VISUAL IMPACT		
<u>View from backyard</u>	57	23
<u>Appearance of neighborhood</u>	29	14
INTRUSIVENESS		
<u>Privacy inside home</u>	14	12
<u>Privacy in backyard</u>	55	26
RADIO/TV RECEPTION	41	24
<u>Number of Respondents</u>	(22)	(35)

ACCESSORY BENEFITS: A LINEAR PARK

Residents living near the Albany linear park are appreciative of the benefits offered by that facility, but this appreciation does not offset their generally negative reactions to a number of specific aspects of BART and to its overall presence in their neighborhood.

Because of the structure of BART facilities, the only accessory benefit that could be examined to learn whether its advantages would offset negative impacts of other features of BART was a linear park.¹ The Albany site was selected with this type of analysis in mind.

As before in examining specific impacts, we report responses to Question 15 which asked about a number of things "that may have changed around your home because of BART." Specifically, we present in Table VII-4 the percent of all respondents who felt that BART had a "very" or a "somewhat" good effect with regard to the particular impact, and we refer to this as a "favorable" response to BART. By taking the percentage of the total set

¹Described in Chapter III.

of respondents rather than only of those who felt that BART had either a good or a bad effect we obtain a statistic that is sensitive both to perception and to evaluation; a "favorable" report, in other words, implies that BART was felt to have this effect and the effect is seen as generally good.

Two independent tests of the BART linear park's effect were possible, since two of the sites (Albany East and Albany West) adjoined the park. Responses to park-related questions from Albany East respondents were compared with those from the San Leandro site, which has no linear park; both sites have backyards adjoining BART aerial tracks, and physical structures and demographics are similar. Albany West responses were compared with those from the Oakland site, since both sites have homes facing BART across the street. Hayward North responses were also tested, since that site is more similar to Albany West physically and demographically than is Oakland. However, the Oakland vs. Albany West comparison is presented here because this proved to be a more rigorous test of the hypothesis; that is, Oakland responses were more similar to those in Albany West than were those from Hayward North.

A comparison of the figures presented in Table VII-4 shows that for each of the five impacts listed, including "trees and other nearby natural features," "the amount of lighting near your home at night," "safety from crime here at home," "safety from crime in this neighborhood," and "the general appearance of your neighborhood," residents of the Albany sites

Table VII-4
EVALUATION OF BART'S ENVIRONMENTAL IMPACTS:
PRESENCE VERSUS ABSENCE OF LINEAR PARK

	Percent of All Respondents Reporting "Very" or "Somewhat" Good Effect of BART (Whole Site)			
	Comparison A		Comparison B	
	Albany West (facing linear park)	Oakland (no park)	Albany East (backyards up against BART)	San Leandro (no park)
<u>Trees</u>	56	24	22	2
<u>Lighting</u>	56	14	15	2
<u>Crime Safety:</u>				
<u>Home</u>	20	2	3	2
<u>Neighborhood</u>	18	6	3	2
<u>Neighborhood Looks</u>	40	40	14	10

responded more favorably than residents of the comparison sites without a linear park. Except for the crime issue, where the effect of a park is ambiguous, one would suppose that each of these impacts would benefit from the presence of a linear park.

A separate analysis of responses from the first sampling stratum shows very similar results, in some cases more pronounced (data not shown). With regard to neighborhood appearance, for example, first stratum Albany West respondents were slightly more favorable than Oakland first stratum respondents (50 percent versus 42 percent), presenting a difference in the reported direction in contrast to the lack of difference found in the last line of Table VII-4 for the sites as a whole. Similarly, the differences regarding crime safety in Comparison B reported in Table VII-4 are insignificant (three percent versus two percent), but among first stratum respondents it is much larger (ten percent versus zero percent in both cases).

From other data not shown we learn a number of additional details. Evaluations of the specific attributes shown in Table VII-4 are not particularly different on the part of the few Albany respondents who specifically said that they were not in favor of the linear park. Residents whose homes back up to the linear park (Stratum One, Albany East) were also less often displeased with the effects of BART on the view from their backyards and shadows on their homes than residents whose homes are not so situated (Stratum One, Albany West). In qualitative responses, most residents attributed the source of positive impacts to the linear park landscaping (impact on neighborhood landscape) and lighting (quality of neighborhood lighting, better crime safety) or to changed street conditions such as improved parking and neighborhood access (data not shown).

Surprisingly, in spite of these favorable responses to the specific elements of the linear park and its consequences, Albany site residents did not have more favorable impressions of the impact of BART overall and in and around their homes. These results are shown in Table VII-5, which presents general evaluations of BART for the same four sites that were contrasted in Table VII-4. Reviewing first the responses from the whole site (upper portion of Table VII-5), overall feelings about BART were about the same for both sites in each comparison. As for its effects in and around the home, somewhat greater displeasure was expressed at the two Albany sites than at the comparable non-park sites selected for comparison. This is counter to what would be expected if the park had a strong positive effect.

Among first stratum respondents (in the lower portion of Table VII-5), these differences are even more clear. Except for the bottom row of Comparison B, unhappy first stratum respondents were from 1½ to two times more frequent at the linear park sites.

Table VII-5
EVALUATION OF BART'S OVERALL IMPACTS:
PRESENCE VERSUS ABSENCE OF LINEAR PARK

	Percent of Respondents			
	Comparison A		Comparison B	
	Albany West (facing linear park)	Oakland (no park)	Albany East (backyards up against park)	San Leandro (no park)
WHOLE SITE				
<u>Overall feelings about BART</u>				
"Happy"/"Unhappy"	49/31	51/32	60/25	66/32
<u>Feelings about BART's effects in/around home</u>				
"Happy"/"Unhappy"	47/31	48/12	27/28	47/22
<u>Number of Respondents</u>	(45)	(52)	(118)	(49)
FIRST STRATUM				
<u>Overall feelings about BART</u>				
"Happy"/"Unhappy"	50/30	68/16	53/35	73/23
<u>Feelings about BART's effects in/around home</u>				
"Happy"/"Unhappy"	43/30	63/16	30/48	36/41
<u>Number of Respondents</u>	(30)	(19)	(40)	(22)

From these results one is led to conclude that the accessory benefit of a linear park is not an effective offsetting advantage for residents who were displeased with other aspects of BART (such as noise). In spite of the park and its admittedly good effects, Albany respondents are not generally more favorable to BART than respondents of comparable aerial sites without a park, and frequently are more unfavorable. However, these results may be somewhat idiosyncratic. The Community Monitoring activity within this study endeavored to identify in a more qualitative

way the sources of opposition to BART at the Albany site, and concluded that Albany opponents of BART responded in a more politicized way than did opponents of BART at other sites.¹ Hence some of the generally negative view of BART in Albany may be part of a larger syndrome of opposition to BART in general, rather than related to specific attributes of the BART facility in Albany. Therefore no conclusive interpretation of these results is possible.

Train Frequency

The technical study of acoustic impacts established the plausible finding that residents were significantly more adversely affected by BART noise along lines where trains ran more frequently.² BART operations dictated that this comparison be made between sites where trains ran every six minutes and those where they ran every 12 minutes.

Our survey of subjective responses to impact does not support this technical conclusion. The most comparable aerial site pair differing in train frequency is Albany East (12 minutes in each direction) and San Leandro (six minutes) because of the similar residential characteristics and configuration of homes in relation to the BART structure. This comparison is shown in Table VII-6.

Table VII-6
EVALUATION OF BART'S ACOUSTIC IMPACTS:
DIFFERENCES IN TRAIN FREQUENCY

	Percent of Respondents Reporting "Bad" Effects	
	Frequency of Trains	
	Infrequent (Trains every 12 minutes) Albany East	Frequent (Trains every 6 minutes) San Leandro
<u>Noise in home</u>		
Whole site	50	41
First stratum	70	45
<u>Noise outside home</u>		
Whole site	55	51
First stratum	85	55

¹Curtis Associates, Community Monitoring, op. cit.

²Specifically, a doubling of train frequency would increase equivalent sound level (L_{eq}) by 3-4 dBA, probably enough to be noticeable; see Acoustic Impacts of BART, op. cit.

With other conditions roughly similar, the site with more frequent trains does not report noise to be more objectionable. On the contrary, regardless of whether one examines first stratum respondents or those from the whole site, respondents at Albany East report more noise both in their home and outside in their yards than respondents at San Leandro where the density and configuration of homes in relation to the BART aerial structure is similar but trains run only half as often. The validity of these responses is further indicated by the fact that nearly all respondents who mentioned noise at these sites referred specifically to the noise generated by passing trains in qualitative responses.

Rather than discrediting the Phase I finding, which has a firm physical basis, and instead of supposing that such discrepancies between objective and subjective impact have a systematic basis, we believe it best to conclude that this is simply one more indication that the Albany results are idiosyncratic. While in part the reports reflect actual physical impact, we suspect that the negative evaluations of BART shown in Table VII-6 stem in part from a politically-aroused sentiment of opposition to BART. Had this political factor not been present the results might have been different.

STATION ATTRIBUTES

Parking

Survey results confirm Phase I conclusions that persons living near stations with overflow on-street parking would be more bothered by this aspect of BART than persons living next to stations with adequate parking. In this Phase II survey we found that persons living next to stations with no on-street parking overflow were more pleased with BART overall and in particular about traffic safety, parking, traffic congestion and access effects than were those living next to stations with such overflow problems. In addition, about one-fourth of the respondents at Daly City, where there is much on-street parking, felt that air pollution from BART-related traffic has become a problem, a much higher figure than at any other site, whether station or not. BART-related traffic is most often cited as the cause of this problem. Daly City attracts more BART-related autos than other stations; in addition, one street next to the station has been widened to become a major traffic corridor, thereby bringing more traffic (much of it BART-related) through the area.

Table VII-7 shows that regardless of whether one examines responses from a whole site or only from the first stratum, persons living near the station site with adequate parking (El Cerrito) are happier with BART overall than are respondents near the other two station sites. Concord residents are clearly least happy with BART overall. However, the difference in this overall evaluation between El Cerrito and Daly City, in spite of Daly City's specific problems with BART parking, is not strong. This indicates that other factors may be more important to these residents in determining their overall attitude toward BART.

Table VII-7
EVALUATION OF BART'S OVERALL IMPACT:
DIFFERENCES IN STATION PARKING FACILITIES

	Percent of Respondents		
	Stations With Parking Overflow		Stations With Adequate Parking
	Daly City	Concord	El Cerrito
WHOLE SITE			
<u>Satisfaction with BART overall</u>			
"Happy"/"Unhappy"	72/10	58/26	82/14
<u>Satisfaction with BART's local effects</u>			
"Happy"/"Unhappy"	58/16	52/21	59/2
<u>Number of Respondents</u>	(50)	(96)	(103)
FIRST STRATUM			
<u>Satisfaction with BART overall</u>			
"Happy"/"Unhappy"	76/10	55/21	85/10
<u>Satisfaction with BART's local effects</u>			
"Happy"/"Unhappy"	62/10	41/20	63/5
<u>Number of Respondents</u>	(21)	(38)	(40)

Specific Traffic-Related Impacts

Differences are more marked between the adequate-parking and inadequate-parking station sites in residents' perceptions of BART's effects on traffic-related conditions such as accident safety, traffic congestion and parking near the respondents' residences.

As shown in Table VII-8, the proportion of respondents living near the adequate parking of the El Cerrito site who feel that BART has had a bad effect in any of these ways is quite small. The impact seen as most detrimental (by 15 percent) is the increased traffic congestion near their

Table VII-8
RESIDENTS' EVALUATIONS OF BART'S TRAFFIC-RELATED IMPACTS

	Percent of Respondents Reporting "Bad" Effects (Whole Stratum)		
	Stations with Parking Overflow		Station with Adequate Parking
	Daly City	Concord	El Cerrito
<u>Safety from traffic accidents near your home</u>	38	47	9
<u>Parking near your home</u>	77	76	5
<u>Traffic congestion near your home</u>	72	69	15

homes. Among first stratum respondents the figure goes up to 25 percent at El Cerrito (data not shown). At the two station sites with overflow parking, the percentages are much larger. A majority of the residents at both sites felt that BART's impact was detrimental regarding parking and traffic congestion, and nearly a majority (47 percent) at the Concord station felt that BART has had a bad effect on traffic safety near their homes. Thirty-eight percent of the Daly City respondents felt this way.

Respondents living in the first sampling stratum were more likely to report each of these impacts of BART as detrimental by roughly ten percentage points, except for safety from traffic accidents among Daly City respondents, where the report from the first stratum was identical to that from the whole site (data not shown). This indicates that the impact is spread throughout the site, which agrees with the technical assessment of Daly City's traffic and parking impacts made earlier.

In qualitative responses to these questions, BART-related automobile traffic was cited most often as the source of reduced safety from accidents near their home by Daly City respondents, while at Concord, responses were equally divided between automobile traffic and parking. Similar responses were given as the source of traffic congestion at those sites. At both sites, at least two-thirds of the persons responding negatively to BART's effects on parking mention the station parking situation as the cause of neighborhood parking problems.

Barrier Effects

Analysis of survey results suggests that the overflow on-street parking at Daly City and Concord is also creating a barrierlike effect. Many more respondents in Daly City (30 percent) and especially Concord (51 percent) than in El Cerrito (one percent) report that BART has had a bad effect on their mobility in and around their neighborhood. (Data not shown in tabular form.)

Qualitative responses indicate that about two-thirds of the respondents in Concord traced the source of this problem to parking by BART patrons. At Daly City, on the other hand, no clear sources were given: most respondents gave vague responses when asked about causes. Both Daly City and Concord neighborhoods adjacent to stations are made up of narrow residential streets not designed for a high volume of on-street parking.

CONCLUSIONS

The results of these analyses suggest that the aerial structures of BART are among the major sources of the system's rather modest detrimental impacts on persons living close to the line. Those aerial structures appear to be the major sources of displeasure with BART in several areas: acoustics, noise, visual environment, privacy, and radio-television reception. Moreover, although our analysis may be handicapped by uncontrolled political factors, those detriments do not appear to be offset by the accessory benefit of a linear park under the aerial structure. Although residents of the site where such a linear park exists are appreciative of the park's accoutrements, such as improved landscaping and lighting, their overall feelings about BART are no better than the feelings of respondents at a comparable site without such a park, and in many cases they are more negative.

At station sites it is clear that overflow on-street parking is a major problem where parking facilities are insufficient. Even so, residents of sites located adjacent to stations are generally more receptive to BART than are residents along aerial lines. Further, it appears that when such parking problems are eliminated (as in El Cerrito), negative responses to BART are almost completely eliminated.

VIII. EFFECTS OF ENVIRONMENTAL DIFFERENCES

In the previous chapter the influence of specific BART attributes on perceived BART impacts was estimated using both site comparisons and the respondents' own identification of the sources of impact. Here we again make use of site comparisons, this time to identify some of the reasons for variation in responses between sites in which BART's own attributes are similar. This chapter focuses on differences in the physical setting, notably housing orientation and "background" activity in the neighborhood. Conclusions are also drawn regarding effects of the distance of the respondent's home from BART.

BACKGROUND ACTIVITY

Increased background rail and traffic activity levels were found to be associated with less negative evaluations of BART's impacts such as noise. From the project's earlier technical impact assessments, it was expected that many impacts would be perceived less strongly in places where levels of background activity such as auto traffic were higher. This was particularly expected for the perception of BART train sound along the portions of the at-grade and aerial lines which share rights-of-way with busy arterial streets and railroad tracks. This issue has important policy implications regarding the choice of locations of such sound-generating facilities.

The case study sites included several which allowed comparative tests of this expectation. Two such comparisons were possible, each between two sites. The first of these involved two at-grade line sites, Richmond and Hayward South, both of which were in low-density suburban neighborhoods with the backyards of the nearest homes facing BART. At both sites, the BART line paralleled an active railroad line; however, in Richmond the effect of this was negligible since it is a single-track line with virtually no use (one or two very slow, short trains per day) and soon to be abandoned altogether. In contrast, the railroad in Hayward is a double-track main line with a number of fast freight trains daily in each direction. Consequently it was expected that BART's impacts, especially train noise, would be viewed as less adverse in Hayward because of the presence of the stronger effects of the railroad.

This expectation was clouded with some uncertainty because of the much greater frequency of BART trains; the actual passage of freight trains "masks" only a small fraction of the BART pass-bys. Thus the issue was whether most of the residents were so accustomed to the extreme effects of the freight trains that the BART effects, although noticeable, would be viewed as relatively insignificant.

Comparison A in Table VIII-1 indicates that this may in fact be so, but only to a low degree. Both in the full site and just for the respondents in Stratum One (backyards abutting BART) responses in Hayward were slightly

Table VIII-1
EVALUATION OF BART'S IMPACTS UNDER
DIFFERENT LEVELS OF BACKGROUND ACTIVITY

STRATUM 1

Feelings about BART's
effects in/around home

"Happy"/"Unhappy"

51/
23

42/
5

26/
53

63/
16

BART noise in home

Good/Bad

3/
31

0/
16

0/
84

5/
21

BART noise outside

Good/Bad

6/
31

0/
16

0/
68

5/
16

Barrier effects

Good/Bad

9/
26

0/
16

5/
11

5/
11

Neighborhood appearance

Good/Bad

17/
14

5/
0

5/
42

42/
21

Number of Respondents

(35)

(19)

(19)

(19)

WHOLE SITE

Feelings about BART's
effects in/around home

"Happy"/"Unhappy"

49/
10

56/
24

63/
32

48/
12

BART noise in home

Good/Bad

1/
18

0/
8

0/
51

4/
17

BART noise outside

Good/Bad

2/
18

6/
6

0/
45

6/
19

Barrier effects

Good/Bad

6/
16

10/
10

4/
4

10/
8

Neighborhood appearance

Good/Bad

10/
6

10/
2

4/
20

40/
12

Number of Respondents

(88)

(50)

(51)

(52)

but consistently less negative regarding BART noise as well as a variety of other impacts which had been expected to be affected.

The second comparison, Hayward North versus Oakland, involved a somewhat different issue. The nearest homes in both sites face BART's aerial tracks across a street (In Oakland, in the median of a divided street but at about the same distance as in Hayward where the line is on the opposite side of a narrow two-way street). The street traffic paralleling BART in the Oakland site (Grove Street) is heavy both day and night, in contrast to the low activity on the comparable street (Western Avenue) in the Hayward site.¹ Thus it was expected that the constant traffic activity would mask BART's sound, resulting in a lower perception of that impact. Because of the apparent dominance of BART train sound over most of its other environmental impacts, it was expected that this in turn would make respondents' evaluations of overall impact and other specific impacts more positive in comparison with those of residents in the Hayward site.

One additional factor was present in this comparison which complicates its interpretation. Housing density is much higher in the Oakland site than in Hayward. The Oakland site is primarily older two-story homes, duplexes, and small apartment buildings on small lots, in contrast to the generally low density, single-family, one-story character of the Hayward housing. The greater height and density of structures in the Oakland site may contribute a lessening of BART's impact by blocking sound and view. However, this should not be true for the first stratum. In addition, such housing densities are often found along arterial streets, and because of their higher population contribute substantially to the area's activity level. Thus what we are comparing here are two different generalized neighborhood activity levels, higher in Oakland and lower in Hayward, which can be associated with neighborhood types commonly found in many cities.

Results are shown as Comparison B in Table VIII-1. As with Comparison A, the evaluations are consistently more positive in the site with the greater background activity level (Oakland). The sole exception is for the barrier effects, which were included primarily for Comparison A's at-grade sites; such effects do not really exist in aerial line sites such as Oakland and Hayward North. In general, these paired differences are large (and statistically significant) as well as consistent, in contrast with the smaller differences found in Comparison A.

¹The Hayward North site has the same railroad paralleling BART as described earlier for Hayward South. However, this effect was judged to be minor in comparison with that of the Grove Street traffic.

Effect of Racial and Economic Differences

Although population characteristics are the subject of the next chapter, one such factor presents a potential threat to this test and must be dealt with here. Both the Richmond and Oakland sites are predominantly Black in population and of low income. The other two are nearly all-white in composition, although Hayward North is also a relatively low-income neighborhood. It was suggested by several study participants and reviewers that disadvantaged minority groups might be expected to be less critical of BART's impacts, because of their relatively little opportunity to escape those impacts by moving to a better area.¹ If this were true, it would confuse the interpretation of the results, as the following diagram indicates.

<u>Background Noise</u> <u>Variable of Interest</u>	<u>Attitudes Toward BART:</u>	
	<u>Comparison A</u>	<u>Comparison B</u>
Lower	(Richmond) <u>Disadvantaged</u>	(Hayward North)
	vs.	vs.
Higher	(Hayward South)	(Oakland) <u>Disadvantaged</u>

However, this should have the effect of making responses in Richmond and Oakland more positive. Note that this would have opposite effects on the two comparisons: it would reduce observed differences in response between Richmond and Hayward South, and increase those same differences between Hayward North and Oakland. As has been shown, however, in both comparisons a definite and consistent difference was found. Therefore, it is unlikely that a racial/economic effect is in operation; even if such an effect exists, it appears not to be of enough significance to overcome the effect of the differences in background activity (noise).

ORIENTATION OF NEAREST HOMES

BART aerial line locations overlooking the backyards rather than the front of the nearest homes are associated with more negative overall appraisals of impact but not of train noise or effects on view as expected. Prior to the survey it was expected that respondents whose backyards -- the most "vulnerable" side of the home -- were exposed to BART lines would feel many of the system's impacts most strongly.

¹Technically, "cognitive dissonance reduction."

This part of the home is not only the most private but also, when facing BART, is typically much closer to the tracks than is the case when the nearest houses face the line across the street. It was observed by study staff that these backyards are in fact often exposed to view from the train, and conversely that the mass of the aerial structure tends to be highly visible from these yards. In addition, the structure casts shadows on yards this close, and the likelihood of adverse noise effects is at its highest.

Two paired-site comparisons were made to test this expectation. In both, a site with its nearest backyards adjoining the BART aerial line is compared with one in which the nearest homes face BART across a local street. The first includes San Leandro (backyard) and Hayward North (front); both are in the low density areas with the same BART train frequency and adjacent railroad traffic, although the San Leandro site's population is economically somewhat better off. The comparison is less than ideal because the BART structure is unusually high and the parallel street unusually narrow at the Hayward site, resulting in a role for BART which seems especially obtrusive. However, other factors made this site the only feasible choice.

The second comparison involved the two contiguous sites on either side of the linear park in Albany. In the Albany East site, backyards face the BART aerial structure, separated only by high (private) fences and a little-used single-track rail line which actually shares BART's right-of-way. The nearest homes in the Albany West site are across the street. They are considerably farther from the BART structure than in San Leandro, both because the street is wider and because BART is set back slightly from the street in the linear park. In Albany West the benefits of seeing the linear park might be expected to mitigate perceptions of BART's more adverse impacts such as sound. This could possibly confuse the interpretation of this comparison's results by widening the expected difference in perception of impacts between East (worse) and West (better).

Results of these two comparisons are presented in Table VIII-2. They do not display quite the same consistency as the findings of the preceding section, but do suggest that in both cases BART's overall environmental effects and its specific effects on shadows and backyard privacy are more adverse in the backyard-facing-BART sites. The results on noise and view were not expected. In Albany the view was perceived as more adverse on the east (backyard-facing) side, but by very little in terms of proportions. The highly negative appraisals of BART noise in both Albany sites may be due in part to that City's continuing and well-publicized complaints against BART's noise impacts since there seems to be no indication that this effect is actually unusually bad here.

Table VIII-2
EVALUATION OF BART'S IMPACTS WITH
NEAREST HOMES FACING TOWARD VERSUS AWAY FROM LINE
(Stratum 1 Only)

	Percent of Respondents			
	Comparison A		Comparison B	
	San Leandro (backyard)	Hayward North (front)	Albany East (backyard)	Albany West (front)
<u>Feelings about BART's effects in/around home</u>				
Happy/Unhappy	36/ ₄₁	26/ ₁₉	39/ ₄₈	43/ ₃₀
<u>BART noise in home</u>				
Good/Bad	0/ ₄₅	0/ ₈₄	0/ ₇₀	0/ ₈₀
<u>View from Inside</u>				
Good/Bad	0/ ₂₇	5/ ₄₇	3/ ₄₀	18/ ₂₉
<u>Shadows on home</u>				
Good/Bad	9/ ₅₀	5/ ₃₇	3/ ₃₃	0/ ₂₄
<u>Privacy in backyard</u>				
Good/Bad	0/ ₅₅	0/ ₃₇	0/ ₅₃	7/ ₁₇
<u>Number of Respondents</u>	(22)	(19)	(40)	(30)

As the table shows, BART's reported effects on noise levels and view in Comparison A were the opposite of our expectations. Other than the unusual configuration of BART and street at the Hayward North site, there is no clear or likely explanation for this anomaly. It may be due merely to the effects of chance in the sample; whatever the cause, the expected finding is not supported by the multiple-comparisons approach in this instance.

DISTANCE FROM BART

BART's impacts are generally limited to the nearest row of houses except along aerial lines, where problems with noise extend to two or three blocks. Both technical assessments and common sense suggested that the adverse effects of BART train sound should decrease farther from the tracks. Sound technicians predicted that noise was likely to be a problem within about 250 to 300 feet (about one

block) of the aerial lines.¹ Similarly, the view of BART from home was expected to be blocked by other structures so that any perceived effect would diminish rapidly with distance. Because of the anticipated importance of factors such as these two in the overall composite of impacts occurring, it was expected that evaluations of BART's overall local effects would become increasingly indifferent among dwellers farther from the system. What was not predictable, however, was the distance at which perceptible and important effects of BART train sound became insignificant.

Many of the tables and discussions in earlier chapters have made it clear that perception of most impacts does in fact diminish rapidly with distance. This section formalizes those findings by illustration of the effects of distance on several key impacts at three representative sites. Stations are represented by El Cerrito, since most of the system's above-ground stations do not have the severe parking and traffic problems associated with Concord and Daly City. Albany East represents the aerial line sites, and Richmond the at-grade areas.

Results by stratum are shown in Table VIII-3, and show that even with the very small samples taken in the outlying strata, the effect of distance is generally consistent and strong. The station results appear to be negligible after the first row of houses, although in contrast at the Daly City and Concord stations the high levels of overflow BART parking and traffic were shown (pp. 77-79) to cause widespread discontent among residents throughout the area affected (4 blocks from BART).

In at-grade line sites perception of impacts seems also to be largely limited to the first row of houses. However, along the aerial lines adverse effects were reported in substantial proportions for the first two strata (about 1-1/2 blocks), with noise perceptions extending still another block farther. For added assurance on this point, an additional stratum was added to the Albany East sample; this was at a distance of some seven to eight blocks from the tracks (nearly one-half mile). As the table shows, adverse reactions to noise at this distance were indeed small (as were all other effects).

¹Up to 500 feet at night; see Acoustic Impacts of Bart, Op. cit.

Table VIII-3
EVALUATION OF BART'S IMPACTS AT DIFFERENT
DISTANCES FROM LINE

		Percent of Responses Good/Bad*		
		Station: El Cerrito	Aerial: Albany East	At-Grade: Richmond
<u>Overall effects</u>				
Stratum 1	(1=closest)	63/5	30/48	51/23
2		63/0	19/26	32/4
3		55/0	16/16	56/0
4		46/0	55/18	70/0
6		-	24/10	-
<u>Noise inside</u>				
Stratum 1		5/13	0/70	3/31
2		3/13	0/67	0/12
3		5/5	0/32	0/11
4		0/0	0/36	0/0
6		-	0/14	-
<u>View from inside</u>				
Stratum 1		18/13	3/40	12/26
2		11/10	0/37	8/0
3		5/9	0/26	0/6
4		18/0	0/0	0/0
6		-	0/0	-
<u>TV reception</u>				
Stratum 1		5/28	0/50	3/24
2		3/3	0/33	0/8
3		5/0	0/5	0/6
4		0/0	0/0	0/0
6		-	0/5	-
<u>Number of respondents</u>				
Stratum 1		(39)	(40)	(35)
2		(30)	(27)	(25)
3		(22)	(19)	(18)
4		(11)	(11)	(10)
6		(0)	(21)	(0)

*For both "good" and "bad" responses, "somewhat" and "very" have been combined.
"Indifferent" responses are omitted.

CONCLUSIONS

The results presented in this chapter indicate that all three of the environmental factors studied -- background activity level, orientation of nearest homes, and distance -- do influence the perception of BART's impacts. The effects of background activity and distance are especially strong. The presence of heavy street traffic in a medium-density residential area appears to result in a reduction in the severity of many impact evaluations from substantial (in an area without such activity) to virtually negligible.

Distance also has a dramatic effect. Impacts at stations and along at-grade lines seem to be negligible beyond the first row of homes, except where parking and traffic problems exist. Along aerial lines, most impacts seem important within a block or two, with noise important as far as about three blocks away.

The effect of housing orientation is significant, but small; when the adjacent homes back up to the BART right-of-way, overall perceptions of adverse effects are stronger, but results for specific impacts are mixed.

IX. EFFECTS OF PERSONAL DIFFERENCES

The two preceding chapters focused on the role of specific BART attributes and physical environmental characteristics as contributory causes of BART's perceived environmental impacts. This chapter's purpose is to probe one final step further, into the possible effects of differences in characteristics of the respondents themselves as factors in their perceptions and evaluations of those impacts. Factors such as the site's differences in racial, economic, life cycle and mobility composition are of interest here, as are the effects of the respondent's use of BART and prior expectations of its usefulness for travel (i.e., its "relevance").

To summarize the results, none of the factors studied were found to have major effects on response to impacts. The demographic characteristics of the respondents, their personality attributes and their expectations of BART play a minor role in determining the level of general and specific complaints concerning BART. The impact of site characteristics and distance from BART play a much more significant role in most respects. Particularly unimportant when considering the effects of site and stratum, despite popular and professional notions to the contrary, were: income, race, sex, hours away from home, housing characteristics, powerlessness, and concern for the environment. Attitudinal factors did not give greater predictability of responses in a reliable way. For example, those expressing sensitivity to noise noticed BART-related noise more often than others, and those who found BART to be disappointing were those generally less satisfied with BART's local effects. In other words, "independent variable"-attitude items only correlated highly with similarly worded "dependent variable"-impact items. In the case of demographics, however, use of BART, age, and length of residence did play significant independent roles in evaluations of BART in several respects. Use of BART seemed to temper general satisfaction with BART and to affect residential mobility, while having no mediating effect upon specific impacts. People under thirty tended to complain more about BART in general and in regard to certain impacts, while those with the shortest length of residence were the most satisfied with BART. On the whole, though, the size and relevance of the particular factors discovered as important offer little to those involved in policy-making decisions.

METHODS

The primary means of analysis of these factors was stepwise multiple regression on pooled responses from several sites. This method (described in detail in Chapter II) was employed instead of full reliance on site comparisons because of limitations imposed by the survey's small sample sizes.

Where possible, the regression analyses were backed by direct comparisons between groups of responses. Some of these were between groups (such as BART users and non-users) within a site; others involved comparisons between

sites whose populations differed in characteristics such as income or ethnicity. Obviously careful judgement is required in interpreting results of such comparisons, since statistical controls on potentially confounding variables are limited. However, these results are consistent with the results of the regression analyses, thereby strengthening their credibility and usefulness.

Tables IX-1 and -2 summarize the findings using four BART-impact variables which are representative of the thrust of the analysis: Awareness of BART's presence, satisfaction with BART's local effects, noise complaints, and immigration due to BART. Table IX-1 indicates that when accounting for the effects of sites and strata, there are few personal factors that are significantly related to these key survey responses. Table IX-2 presents the same overall finding in a different way: for three of the four dependent variables, site and stratum explain more of the variance than do demographic variables.

Table IX-1

SIGNIFICANCE OF F-SCORES AND DIRECTION OF RELATIONSHIPS FOR FOUR DEPENDENT VARIABLES: NOTICE BART NEARBY, SATISFACTION WITH BART LOCALLY, NOISE IMPACT, AND CHOSE HOME FOR BART
(All sites combined: N = 702)*

Variables in the Final Equation With Sites and Strata	Notice BART	Local Satisfaction	Noise	Chose Home
Frequent BART User	-	.001 (+)	-	.001 (+)
Never Used BART	-	-	-	-
Age	-	.001 (+)	.001 (-)	-
Length of Residence	-	.001 (-)	-	.001 (-)
Home Ownership	-	-	-	-
Single Family Home Dweller	-	-	-	-
Females	.01 (+)	-	-	-
White	-	-	-	-
Income	-	-	-	-
Home Faces BART	-	-	-	-
Hours Away From Home	-	-	-	-
Powerlessness	-	-	-	-
BART Expectations	-	.001 (+)	-	-
Noise Sensitivity	-	.01 (-)	.001 (+)	-
Environmental Concern	-	-	-	-

*All sales scored from low to high. F-scores are from final regression equations.

Table IX-2

STEPWISE REGRESSIONS - PERCENT OF THE VARIANCE EXPLAINED BY SITE, STRATUM AND DEMOGRAPHIC FACTORS FOR FOUR (4) DEPENDENT VARIABLES: NOTICE BART NEARBY, SATISFACTION WITH BART LOCALLY, NOISE IMPACT, AND CHOSE HOME FOR BART (ALL SITES COMBINED)*

Variables in the Equation	Notice BART	Local Satisfaction With BART	Noise of BART	Chose Home BART
Site (Step 1)	.04	.09	.19	.04
Site, Stratum (Step 2)	.05	.10	.25	.05
Site, Stratum, Demographics ¹ (Step 3)	.09	.17	.28	.22
New Variance Explained by Demographics	.04	.07	.03	.17
*Dependent variables scored from low to high. Attitude items dropped because the few significant ones lacked reliability. ¹ See Table IX-2 for listing of demographics.				

The discussion of the analysis is divided into two parts: general responses to BART and perceptions of specific impacts. Each section reviews the personal factors entered into the regression equations after the dummy variables for site and stratum: age (Q32a), sex (QA), length of residence (Q7), income (Q42), race (Q8), home ownership (Q1), hours away from home (Q32c), use of BART (Q25), type of dwelling (QE), orientation to BART (Q6), powerlessness (Q40), noise sensitivity (Q36), concern for the environment (Q37), expectations of BART (Q28b). Again, as stated in Chapter II, concern was with the additional variance demographic and attitudinal factors can explain, and with how significant specific personal factors were in the final regression equations (i.e., F-scores significant at .001 were considered very important contributors, F-scores significant at .01 were somewhat important, and lower scores were ignored, based upon considerations of sample sizes). Discussions of subgroups (i.e., aerial and station site respondents) are dealt with in the general context of the results, specifically when they point to discrepancies with the pooled analysis or bring to bear site type-specific dependent variables (e.g., traffic and parking impacts in stations, and vibration and privacy problems in aerial sites).

GENERAL RESPONSES TO BART

The items concerning how often people noticed BART (Q10, Q11), how satisfied they were with BART overall (Q19a, Q19b), and what impact BART had on desired or actual residential mobility (Q28a, Q29a, Q29b) are examined.

None of the various indicators of disadvantaged status played a role in explaining any of these general responses to BART. Personality attributes also had no additional explanatory value. One BART-related attitude, expectations of the transit system, did have a significant impact on responses to the items on overall satisfaction. However, the importance of that relationship may be discounted because of the similarity in item wording.

Use of BART played an important mediating role in relation to the items on overall satisfaction and mobility. For one, frequent users of BART were significantly more positive with respect to BART's local effects ($F = 24, p < .001$). Also, these individuals were more likely to choose their home for BART-related reasons ($F = 31, p < .001$), though they did not seem especially likely to notice BART at home or in the neighborhood.

With the exception of age and length of residence, other sociodemographic factors played a considerably minor role in explaining general attitudes towards BART. For example, females were slightly more likely to notice BART nearby than were males ($F = 7.4, p < .01$) and other factors fell below this level of significance. Age was relevant to local satisfaction ($F = 11.3, p < .001$), particularly so in station sites where the younger people (less than 30) tended to complain more frequently.

Shorter lengths of residences also tended to be associated with less hostility towards the system, again particularly in station sites (note: while the correlation between age and length of residence was .6, the correlation between recent movers and those less than thirty was only .3, meaning that many of the recent arrivers who were low complainers need not be typically young). In addition, since youthfulness is a strong predictor of mobility and since the transit system is fairly new, it is no surprise that choosing a home to be near BART is related to a lower age and also a shorter length of residence. In fact, all the findings on overall satisfaction and low length of residence are probably somewhat explained by the fact that among recent movers are people choosing a residence with BART in mind and using the transit system fairly regularly.

In all, for the items examined, very little additional variance was explained by the demographic and attitudinal factors (see Table IX-2). For example, after the inclusion of sites and strata personal factors explained an additional four percent of the variance in the "notice BART" items, an additional seven percent of the variance in the "overall satisfaction" items, and about 17 percent of the variance in the immigration item (the latter was highly inflated by BART use and length of residence). No demographic factors came close to the impact of site and strata in predicting BART-related outward mobility. In fact, with the exception of use of BART, the other personal factors are not of sufficient intensity, consistency, reliability (e.g., attitudes), or substantive importance to warrant very serious attention after accounting for sites and strata (see Table IX-2).

SPECIFIC ENVIRONMENTAL IMPACTS

The major concern here was with noise impact (Q51b), the most persistent and perhaps most significant adverse impact of BART reported in this study. In addition, for the subgroups of station respondents, responses concerning traffic and parking (Q15r, Q15s) are analyzed, and for the aerial subgroup, perceptions of vibrations and privacy (Q15d, Q15j) are examined. The findings of this analysis can be best summarized by this statistic: while the effects of sites and strata explained 25 percent of the variance of the noise item, the demographic factors added only an additional three percent of the variance (see Table IX-2). The noise sensitivity attitude item did correlate significantly with the noise impact item, however the interpretation of that particular relationship appears to be problematic.

Examining disadvantaged status first, there were no indications that this factor played any role in perceptions of specific impacts. Use of BART which played a significant part in global assessments, had no important role in the formulation of specific complaints such as noise, traffic, parking, vibrations, and privacy in both the pooled and subgroup analyses. Of the other sociodemographic characteristics considered, only age was related to noise impacts within subgroups and also in the pooled analysis ($F=26, p < .001$). Again, there was a strong tendency for younger respondents to complain more about noise, and this was replicated in complaints about parking and traffic among the station residents.

Also, among station site dwellers, those who had a shorter length of residency tended to complain less about parking ($F=7.9, p < .01$) and traffic problems ($F=11.8, p < .001$), though not significantly less about noise. Interestingly, single family home dwellers in station sites were also more likely to complain about parking ($F=22.1, p < .001$) and traffic problems ($F=7.4, p < .01$). However, people with these characteristics did not seem to complain more about noise than others did.

A model that might explain these phenomena would be the following: traffic and parking (unlike noise) occurs in residential space, and these invasions of the home territory are keenly noticed by those most concerned about the neighborhood, that is, single family home dwellers and long time residents. With regard to attitudes, only noise sensitivity was consistently related to noise impact across both subgroups ($F = 12, p < .001$). "BART expectations" had no significant effect on these specific impacts, leading one to doubt even further the validity of the reported relationships with the general satisfaction items. "Environmental concern" was not related to the perceptions of any environmental impacts, and powerlessness was related only to less negative appraisals of parking problems in station sites ($F = 8.9, p < .01$). The attitudinal items thus tell little about prediction of perceived impacts. This seems to be the case particularly when considering that noise from BART may cause people to report of being bothered by noise per se, rather than making a causal argument in the other direction.

Summarizing these findings on the effects of personal differences on perceptions of specific impacts, it is obvious that BART attributes play a major role in determining responses while almost all demographics and attitudes are minimal in significance (see Table IX-1).

USE OF BART: FURTHER ANALYSES

Ecological comparisons between sites were possible for "BART use", since one station site (Daly City) sample included a substantially higher proportion of BART users than found at the other two station sites. A comparison between Daly City and Concord showed that the Daly City sample were more positive in their evaluations of BART's impacts. However, a stronger test was available in this instance: since absolute numbers of BART users were over 20 in both the Daly City and El Cerrito Plaza samples, it was possible to conduct two independent within-site comparisons of users and non-users.

The results of these two comparisons are displayed in Table IX-3. The impacts selected for presentation are those which, prior to the survey, were of greatest overall concern. The survey results already presented have indicated that most of these effects are also of concern to many residents. However, two (air pollution and crime) are shown despite their lack of demonstrated general importance because it was felt that their evaluation by residents was likely to be especially sensitive to BART use.

In general, the results are quite consistent both between the two sites and across the set of impacts considered: BART users do seem to be more positive in their evaluation of the overall level of impact as well as several of the specifics including noise, parking, and traffic. However, we are hesitant to risk overstatement of the strength of this result by interpreting its effect at the level of specific impacts, and therefore conclude only that it seems clearly related to the evaluation of BART's net effects on the neighborhood environment.

We acknowledge that in these comparisons not all other potentially influential factors could be controlled. However, inspection of the data did indicate that the comparisons included no "surprises". That is, the pairs of subsamples compared did not differ internally to any major extent on characteristics such as distance to BART, age, sex, race, and income.

CONCLUSIONS

This chapter's findings indicate that it is erroneous to assume that low income individuals and low status ethnic groups are less likely to develop negative attitudes towards a local transit service or less likely to perceive adverse environmental impacts than more affluent and higher status residents. Further, rather than attention to the "complacent" attitudes of the elderly toward the adverse residential impacts of BART, the re-

Table IX-3
EVALUATIONS OF BART'S IMPACTS BY BART USERS VERSUS NON-USERS

Percent of Respondents				
Comparison A:		Comparison B:		
Daly City		El Cerrito Plaza		
Users	Non-Users	Users	Non-Users	
<u>Overall effects on neighborhood</u>				
Happy/Unhappy	74 _{/2}	41 _{/22}	81 _{/0}	53 _{/3}
<u>Noise inside home</u>				
Good/Bad	9 _{/17}	5 _{/23}	11 _{/0}	0 _{/12}
<u>Neighborhood appearance</u>				
Good/Bad	39 _{/17}	41 _{/18}	44 _{/4}	28 _{/3}
<u>Air pollution at home</u>				
Good/Bad	9 _{/14}	5 _{/36}	7 _{/4}	8 _{/5}
<u>Parking near home</u>				
Good/Bad	0 _{/70}	0 _{/86}	26 _{/0}	12 _{/7}
<u>Traffic safety</u>				
Good/Bad	9 _{/35}	5 _{/46}	15 _{/7}	12 _{/9}
<u>Crime near home</u>				
Good/Bad	30 _{/17}	14 _{/9}	15 _{/15}	8 _{/3}
<u>Number of Respondents</u>				
	(23)	(22)	(27)	(59)

sults suggest that the focus of policy should perhaps be on the high level of complaints generated by the youngest age groups and the long-term neighborhood residents. The data indicate that age differences in survey responses may be due to the hypercritical attitudes of the younger generations rather than under-reporting by the elderly. This point is reaffirmed by the important impact of length of residence, which indicates that long term (sometimes older) residents, who perhaps have the strongest sense of community, are not particularly favorable towards BART's local presence. It would thus be dangerous to assume that certain age groups will lack resistance or express no concerns over potential environmental stressors in their residential environments.

Lastly, it seems trivial though perhaps profound wisdom from the BART experience to conclude the following: no amount of planning, publicity, or public relations can probably come near the impact of regular use of the BART system on favorable attitudes towards it local and overall effects. Ironically, it seems as if a good way to make a system relatively well-liked on a local and regional level is to insure that it will be sufficiently utilized.

SURVEY SAMPLING AND COMPLETION RATES BY SITE AND STRATUM

Site	Stratum	Total Housing Units In Stratum	Number Housing Units In Sample	Sampling Rate	Interviews Completed	Completion Rate (%)
1 Daly City	Overall		70		50	71
	1	120	26	.22	21	81
	2	109	20	.18	14	70
	3	113	16	.14	10	62
	4	31	8	.26	5	62
2 Richmond	Overall		137		88	64
	1	101	56	.55	35	62
	2	181	41	.52	25	61
	3	168	26	.15	18	69
	4	114	14	.12	10	71
3 El Cerrito	Overall		144		103	72
	1	107	55	.51	40	73
	2	85	44	.52	30	68
	3	38	30	.79	22	73
	4	58	15	.26	11	73
4 ¹ Albany East	Overall		168		118	70
	1	86	52	.60	40	77
	2	230	43	.19	27	63
	3	253	26	.10	19	73
	4	180	18	.10	11	61
	6	105	29	.28	21	72
5 Albany West	Overall		72		45	63
	1	76	43	.57	30	70
	2	235	29	.12	15	52
6 Oakland	Overall		76		52	68
	1	72	34	.47	19	56
	2	71	20	.28	17	85
	3	98	14	.14	9	64
	4	66	8	.12	7	88
7 Concord	Overall		127		96	76
	1	82	52	.63	38	73
	2	84	37	.44	29	78
	3	91	27	.30	19	70
	4	31	11	.35	10	91
8 San Leandro	Overall		80		49	61
	1	40	32	.80	21	66
	2	95	24	.24	14	58
	3	100	18	.18	9	50
	4	99	6	.06	5	83
9 ² Hayward North	Overall		75		51	68
	1	102	29	.28	19	66
	2	194	22	.11	16	73
	3	133	14	.11	10	71
	4	103	10	.10	6	60
10 Hayward South	Overall		64		50	78
	1	87	25	.29	19	76
	2	192	18	.09	15	83
	3	101	14	.15	10	71
	4	17	7	.41	6	86
Overall Totals	1	873	404	.463	282	70
	2	1,476	298	.201	202	68
	3	1,045	185	.177	126	68
	4	804	97	.121	71	73
	6	105	29	.28	21	72
All Strata			1,013		702	69

¹In Albany East (Site 4) the original sample was expanded by a second independent draw. This additional sample included the following portions of the totals shown in the table:

Stratum.... 1 2 3 4 6 Total

Cases added... 26 22 12 10 29 99

²This includes 12 cases added to the original sample in Strata 1 and 2 in Site 8, and 3 cases added to Stratum 1 in Site 9 due to difficulties in meeting completion targets from the original sample. In addition, vacant addresses were replaced where necessary and feasible.



SURVEY FORM

DeLeuw, Cather & Co.
120 Howard Street
San Francisco, California 94102

WCCS 452
5/76
Form 1

BART WAYSIDE IMPACT SURVEY

1-3		

SUGGESTED INTRODUCTION: Hello, I'm _____ from West Coast Community Surveys and we're conducting a survey here in the Bay Area. I'm supposed to ask one person in your (house) (apartment) questions about what it's like to live here, how you've been affected by things like BART, bus service and traffic near here. We're trying to find out the main things people like or don't like about some of these transportation facilities, so that planners can do a better job in the future.

In order to know which person to interview, I need to know how many men and women who are 18 or older live here.

_____ men 18 or older AND _____ women 18 or older

- [] IF ONLY ONE ADULT IN HOUSEHOLD, ARRANGE TO INTERVIEW THAT PERSON.
- [] IF BOTH MEN AND WOMEN: I'd like to talk to (the youngest man who's at home now) (the man of the house if he's home now) (PERSON).
- [] IF NO MEN ARE AT HOME (OR IF NO MEN LIVE IN HOUSEHOLD): Then the person I'm supposed to talk to is the (oldest woman who's at home now) (the lady of the house if she's here) (PERSON).

IF NEEDED:

I work for West Coast Community Surveys, and our job on this study is to do the actual interviewing with the people whose homes fell into our sample.

We're collecting the data for DeLeuw, Cather, & Co. which is a San Francisco consulting firm in planning and engineering responsible for designing the study and writing the report.

The study has the support of the Metropolitan Transportation Commission, which is a public agency, established by the State of California to help do regional planning for the Bay Area.

IF WANTS TO CHECK ON WCCS: If you'd like to call the office, the number is 549-3585.

IF WANTS TO CALL MTC: The number is 849-3223 and the person who knows most about the study is Andrew Ungar.

EXPLAIN TO ELIGIBLE RESPONDENT:

(REPEAT INTRODUCTION IF NECESSARY). My questions usually take about half an hour or so. Is this a convenient time for our talk? (IF NOT, MAKE APPOINTMENT TO COME BACK)

--	--	--

TIME BEGAN: _____ A.M.
 _____ P.M.

1. My first questions are about your home and the neighborhood. Do you own or rent your home?

Own 4/ 1
 Rent 2
 Other (SPECIFY: _____) 3

2. Everything considered, would you say that the location of your home here in this block is a very pleasant place for you to live, sort of pleasant, sort of unpleasant, or very unpleasant?

Very pleasant 5/ 1
 Sort of pleasant 2
 Neither pleasant nor unpleasant . 3
 Sort of unpleasant 4
 Very unpleasant 5

3. Thinking of how you like living here, how would you rate your home's location compared to other places in the Bay Area that cost about the same? Would you say this location is much better than most places in the Bay Area, somewhat better, about the same, somewhat worse, or much worse than most places in the Bay Area?

Much better than most places . . 6/ 1
 Somewhat better 2
 About the same 3
 Somewhat worse 4
 Much worse 5

4. Now I'm going to read you a list of things about home locations and for each one I'd like you to tell me whether you think your location here is very good for you, fairly good, fairly bad, or very bad. HAND WHITE CARD A. You can pick your answer from this card.

How about (EACH ITEM)?

How about (EACH ITEM)?	Very good	Fairly good	Half and half	Fairly bad	Very bad
A...the people who live right around here (within a block or two) 7/ 1	2	3	4	5	
B...the parks or playgrounds nearby 8/ 1	2	3	4	5	
C...trees and other natural features 9/ 1	2	3	4	5	
D...parking for people who live around here . 10/ 1	2	3	4	5	
E...the children and teenagers you see around here 11/ 1	2	3	4	5	
F...the quality of schools around here . . . 12/ 1	2	3	4	5	
G...safety from crime 13/ 1	2	3	4	5	
H...the number of large vehicles like trucks and buses going past here 14/ 1	2	3	4	5	
I...traffic in general around here 15/ 1	2	3	4	5	
J...the general appearance of most homes around here 16/ 1	2	3	4	5	
K...the bus service 17/ 1	2	3	4	5	
L...privacy in your home (and yard) 18/ 1	2	3	4	5	
M...BART service 19/ 1	2	3	4	5	
N...having the BART line nearby 20/ 1	2	3	4	5	
O...the way the streets and sidewalks are kept 21/ 1	2	3	4	5	
P...the amount of construction work around here 22/ 1	2	3	4	5	
Q...air quality or smell 23/ 1	2	3	4	5	
R...convenience of nearby shopping 24/ 1	2	3	4	5	

5. ON PINK SHEET, CHECK BOXES BEFORE EACH ANSWER CODED GOOD (VERY OR FAIRLY) AND HAND TO RESPONDENT:

- A. Here's a list on which I've marked the answers you rated very good or fairly good for this location. If you had to choose, which one of these would you say you like (best) (next best) about living in this location -- which letter would it be?

#1 (best) item:	_____	25-26/
#2 (next best):	_____	27-28/
#3 (3rd best):	_____	29-30/

- B. Are there any other good things (not on the list) that are just as important or more important to you than (ANSWER RANKED #3 ABOVE)? (What do you have in mind?)

31-33

--	--	--

[] No, nothing else
that important

6. ON BLUE SHEET, CHECK BOXES BEFORE EACH ANSWER FROM Q 4 CODED BAD (VERY OR FAIRLY) AND HAND TO RESPONDENT:

- A. Now would you do the same thing with the worst things about your home location. If you had to choose, which one would you say you dislike (most) (next) about living in this location -- again, just give me the letter.

#1 (worst) item:	_____	34-35/
#2 (next worst):	_____	36-37/
#3 (next worst):	_____	38-39/

- B. And are there any other bad things (not on the list) about living here that are just as important or more important to you than (ANSWER RANKED #3 ABOVE)? (What sorts of things do you mean?)

40-42

--	--	--

[] No, nothing else
that important

7. About how long have you lived at this address?

43-45/

About _____ months OR _____ years OR Since _____, 19____
month year

8. ASK ALL, CHOOSING APPROPRIATE VERSION OF A:

- A. (IF LIVED HERE LESS THAN 15 YEARS: During the time that you've lived here...)
(IF LIVED HERE 15 YEARS OR MORE: During the last 15 years . . .)

Would you say that this neighborhood has gotten to be a better or worse place
for you to live? [Would you say it's much (better) (worse) or just somewhat
(better) (worse)?]

Much better 46/ 1*
Somewhat better 2*
No change (SKIP TO Q 9) . . . 3
Somewhat worse 4*
Much worse 5*

*IF EITHER BETTER OR WORSE:

- B. In what way is it (better) (worse) now than it was? (Any other ways?)

- C. And, as you see it, what caused this? RECORD VERBATIM, PROBING FOR CLARITY.
THEN CODE BELOW.

47-51

52-56

--	--	--	--	--	--	--	--	--	--

BART caused it 57/ 1

Other (SPECIFY: _____ 2

9. Now some questions about BART (IF NEEDED: the Bay Area Rapid Transit System which carries people around some of the Bay Area on trains) . . .

A. About how far away (in a straight line, not necessarily walking) is the closest BART station? CODE IN FIRST COLUMN.

B. And how far away is the closest BART line? CODE IN SECOND COLUMN.

	A	B
Right next to home or building	58/ 1	59/ 1
Right across the street	2	2
Less than 1 block or 200 feet	3	3
Other (SPECIFY: _____)	blocks	blocks
	feet	feet
	miles	miles

10. A. Now we'd like to know how much you notice anything about BART -- not whether you like it or not, just whether you notice it. First, when you're here at home (either inside or in the yard) how much do you notice BART (facilities or trains)? Would you say you notice BART quite a lot, very little, or not at all?

Quite a lot 60/ 1*

Very little 2*

Not at all (SKIP TO Q 11) 3

*IF BART NOTICED AT ALL:

B. What one thing do you notice most about BART when you're at home?

C. Is there anything else that you particularly notice?

61					65						70
----	--	--	--	--	----	--	--	--	--	--	----

11. A. How about when you're not at home but within a few blocks from home. Would you say you notice BART quite a lot, very little, or not at all when you're within a few blocks from home?

Quite a lot 4/ 1*
 Very little 2*
 Not at all (SKIP TO Q 12) 3

*IF BART NOTICED AT ALL:

- B. What one thing do you notice most about BART when you're a few blocks from home?

- C. Is there anything else that you particularly notice?

5-10

12. A. Do you ever see any of the BART trains, tracks, stations or parking lots from any windows in your home? (Which of those do you see?) IN FIRST COLUMN, CODE ALL THAT APPLY.
- B. How about from your yard? (Which, if any, do you see from your yard?) IN SECOND COLUMN, CODE ALL THAT APPLY.

	<u>A</u>	<u>B</u>
	<u>From windows</u>	<u>From yard</u>
BART trains	1 11/	1 17/
BART tracks	2 12/	2 18/
BART station	3 13/	3 19/
BART parking lots	4 14/	4 20/
Other (SPECIFY: _____)	5 15/	
(SPECIFY: _____)		5 21/
None. Can't see any . . .	6 16/	6 22/
DNA. No yard		7 23/

	<u>Yes</u>	<u>No</u>
13. A. Can you see any traffic on freeways or highways from anywhere in either your home or yard?	24/ 1	2
B. How about any other streets with lots of traffic on them -- can you see any of those from either your home or yard?	25/ 1	2
C. Can you see any railroad tracks or trains other than BART from your home or yard?	26/ 1	2
<hr/>		
14. A. Where were you living during the time when BART's nearby line or station was being built -- were you here in this (house) (building), within a few blocks from here, elsewhere near BART, or someplace else that was not close to BART?		
In same house or building	27/ 1*	
Within a few blocks from here		2*
Elsewhere near BART (SKIP TO Q 15)		3
Somewhere else, not close to BART (SKIP TO Q 15)		4
*B. IF HERE (SAME BUILDING) OR WITHIN A FEW BLOCKS FROM HERE: Thinking back to when the nearest BART line or station was built, how would you say the BART construction affected this neighborhood -- would you say it had a very bad effect, fairly bad, fairly good, very good effect, or no effect at all on this neighborhood?		
Very bad effect	28/ 1**	
Fairly bad effect		2**
No effect (GO TO Q 15, SKIPPING NEXT PAGE)		3
Fairly good effect		4**
Very good effect		5**

**IF BART CONSTRUCTION HAD ANY EFFECT ON NEIGHBORHOOD,
CONTINUE WITH NEXT PAGE.

**IF BART CONSTRUCTION HAD ANY EFFECT ON NEIGHBORHOOD:

- C. Here are some kinds of things that can happen when there's major construction going on. We're interested in knowing whether each of these things was good or bad for you during the BART construction near here. As I read each one, please pick one answer off this card (HAND YELLOW CARD B) to tell me how good or bad the effect was.

	Very good effect	Some- what good effect	Half and half	Some- what bad effect	Very bad effect	No effect
(1) First, how about noise? . . . 29/ 1	2	3	4	5	6	
(2) How about truck traffic? . . . 30/ 1	2	3	4	5	6	
(3) ...dust and dirt? 31/ 1	2	3	4	5	6	
(4) ...streets blocked and dug up? 32/ 1	2	3	4	5	6	
(5) ...homes removed? 33/ 1	2	3	4	5	6	
(6) ...place for kids to play? . . 34/ 1	2	3	4	5	6	
(7) ...length of time BART construction took? 35/ 1	2	3	4	5	6	

- D. Was there any (other) good effect when BART construction was going on? (What?)

[] No, no good effect

- E. And was there any (other) bad effect when BART construction was going on? (What?)

36					40				
----	--	--	--	--	----	--	--	--	--

[] No, no bad effect

15. Here is a set of cards with different things that may have changed around your home because of BART. Would you sort them into piles for me. If you think BART's effect on something has been very good for you, put the card in this pile (POINT). If you think its effect on something has been very bad for you, put the card at the opposite end (POINT). There's also a slot for somewhat good (POINT) and somewhat bad (POINT). If you think that the effect has been half good and half bad and you really can't choose, put the card here in the middle (POINT). If you don't think BART has had any effect at all, please put the card on the side here (POINT). You can put as many cards as you like in any pile.
- A. First, please read me the letter of each card in your very good effect pile.
CIRCLE CODES IN FIRST COLUMN OF FACING PAGE.
- [] NO MORE THAN 3 CARDS IN VERY GOOD PILE. SKIP TO B BELOW.
- [] IF MORE THAN 3 CARDS IN VERY GOOD PILE, ASK: If you had to choose the three BART had the best effect on from your standpoint, which would they be?

- B. Which ones are in your somewhat good effect pile? CODE IN SECOND COLUMN.
- [] THREE BEST EFFECTED ALREADY CLEAR. SKIP TO C.
- [] IF THREE BEST EFFECTS NOT YET CLEAR, ASK: If you had to choose (NUMBER NEEDED), which of these would you say BART had the best effect on?

- C. Does BART have any other good effects for you here around home that are better than some of these you just chose?
- [] Yes (SPECIFY: _____) [] No
- D. Which of the cards did you put in the very bad effect pile? CODE IN THIRD COLUMN.
- [] NO MORE THAN 3 CARDS IN VERY BAD PILE. SKIP TO E BELOW.
- [] IF MORE THAN 3 CARDS IN VERY BAD PILE, ASK: If you had to choose, which three of these would you say BART had the worst effect on?

- E. And which ones are in your somewhat bad effect pile? CODE IN 4TH COLUMN.
- [] THREE WORST EFFECTS ALREADY CLEAR. SKIP TO F.
- [] IF THREE WORST EFFECTS NOT YET CLEAR, ASK: If you had to choose (NUMBER NEEDED), which of these would you say BART had the worst effect on?

- F. Does BART have any other bad effects for you here around home that are worse than some of these you just chose?
- [] Yes (SPECIFY: _____) [] No
- G. IF NEEDED: Which ones are in the middle pile -- the half and half group?
CODE IN 5TH COLUMN.
- H. IF NEEDED: And which ones did you put in the "no effect" group?
- CHECK TO MAKE CERTAIN THAT ONE AND ONLY ONE COLUMN IS CODED FOR EACH.

	Very good effect	Somewhat good effect	Somewhat bad effect	Very bad effect	Half and half	No effect
A...the view from inside your home 44/ 1	2	3	4	5	6	
B...noise <u>inside</u> your home 45/ 1	2	3	4	5	6	
C...noise <u>outside</u> your home (in the yard on the porch) 46/ 1	2	3	4	5	6	
D...vibration inside your home . . 47/ 1	2	3	4	5	6	
E...vibration just <u>outside</u> your home 48/ 1	2	3	4	5	6	
F...the view from your backyard . 49/ 1	2	3	4	5	6	
G...the amount of lighting near your home at night 50/ 1	2	3	4	5	6	
H...the general appearance of your neighborhood 51/ 1	2	3	4	5	6	
I...privacy in your backyard . . . 52/ 1	2	3	4	5	6	
J...privacy inside your home . . . 53/ 1	2	3	4	5	6	
K...air pollution around your home 54/ 1	2	3	4	5	6	
L...shadows on your yard or home . 55/ 1	2	3	4	5	6	
M...wind around your home 56/ 1	2	3	4	5	6	
N...television or radio reception. 57/ 1	2	3	4	5	6	
O...safety from crime here at home 58/ 1	2	3	4	5	6	
P...safety from crime in this neighborhood 59/ 1	2	3	4	5	6	
Q...safety from traffic accidents near your home 60/ 1	2	3	4	5	6	
R...parking near your home 61/ 1	2	3	4	5	6	
S...traffic congestion near your home 62/ 1	2	3	4	5	6	
T...trees and other nearby natural features 63/ 1	2	3	4	5	6	
U...air quality or smell around here 64/ 1	2	3	4	5	6	
V...the kinds of people who live around here 65/ 1	2	3	4	5	6	
W...construction or removal of nearby houses 66/ 1	2	3	4	5	6	
X...helping or blocking you from getting to places in the neighborhood 67/ 1	2	3	4	5	6	

16. A. PREPARE ONE BOX FOR EACH OF THE THREE BEST EFFECTS OF BART

PART (1) What is it about BART [that makes (ITEM) good] [has a good effect on (ITEM)]

FROM

Q 15:

- (2) We're interested in anything you do or do differently now in your everyday life because of this change. (Is there anything at all -- even little things?) (What else, if anything, have you changed because of this?)

PART (1) What is it about BART [that makes (ITEM) good] [has a good effect on (ITEM)]

FROM

Q 15:

- (2) We're interested in anything you do or do differently now in your everyday life because of this change. (Is there anything at all -- even little things?) (What else, if anything, have you changed because of this?)

PART (1) What is it about BART [that makes (ITEM) good] [has a good effect on (ITEM)]

FROM

Q 15:

- (2) We're interested in anything you do or do differently now in your everyday life because of this change. (Is there anything at all -- even little things?) (What else, if anything, have you changed because of this?)

16. B. PREPARE ONE BOX FOR EACH OF THE THREE WORST EFFECTS OF BART

PART (1) What is it about BART [that makes (ITEM) bad] [has a bad effect on (ITEM)]?

FROM

Q 15: (2) We're interested in anything you do or do differently now in your everyday life because of this change. (Is there anything at all -- even little things?) (What else, if anything, have you changed because of this?)

PART (1) What is it about BART [that makes (ITEM) bad] [has a bad effect on (ITEM)]?

FROM

Q 15: (2) We're interested in anything you do or do differently now in your everyday life because of this change. (Is there anything at all -- even little things?) (What else, if anything, have you changed because of this?)

PART (1) What is it about BART [that makes (ITEM) bad] [has a bad effect on (ITEM)]?

FROM

Q 15: (2) We're interested in anything you do or do differently now in your everyday life because of this change. (Is there anything at all -- even little things?) (What else, if anything, have you changed because of this?)

Q18 THIS PAGE FOR EVERYONE !!!

17. ASK ONLY RESPONDENTS IN LINEAR PARK STUDY (ALBANY):

--	--	--

- A. (As you probably know, there is a landscaped strip and walkway beneath the BART tracks near here.) How do you think (it) (the landscaped strip and walkway) has affected things -- would you say it's had a very good effect, a fairly good effect, a fairly bad effect, or a very bad effect around here?

Very good effect 4/ 1
 Fairly good effect 2
 Half and half 3
 Fairly bad effect 4
 Very bad effect 5
 No effect 6

- B. How often, if ever, (does anyone in your household) (IF LIVES ALONE: do you) use it? (Does someone use it often, only occasionally, or don't any either of you use it at all?)

Someone uses it often 5/ 1
 Someone uses it only occasionally . . . 2
 No one in household uses it 3

18. ASK ALL:

- A. When you're at home, are there any special times of day or night when you're more likely to notice anything about BART?

Yes 6/ 1*
 No (SKIP TO Q 19, NEXT PAGE) . . . 2

*IF YES:

	4 - 7 AM 7/	7 - 9 AM 8/	9 - 4 PM 9/	4 - 7 PM 10/	7 - 10PM 11/	10PM - 12 12/
B. How likely are you to notice BART between (EACH TIME PERIOD)? (HAND GREEN CARD C)	Very....1 Fairly..2 Not.....3	Very....1 Fairly..2 Not.....3	Very....1 Fairly..2 Not.....3	Very....1 Fairly..2 Not.....3	Very....1 Fairly..2 Not.....3	Very....1 Fairly..2 Not.....3
C. IF AT ALL LIKELY: What do you notice (then) (between) and _____)? (Any-thing else you notice then?)						
	13-16/	17-20/	21-24/	25-28/	29-32/	33-36/

19. A. How happy or unhappy are you about BART's effects just on your life here in and around your home (not counting travel, taxes, and things like that)? (IF NEEDED: Would you say you're very happy, fairly happy, fairly unhappy or very unhappy about BART's effects on your life here at home?) CODE IN FIRST COLUMN BELOW.

B. To sum up the way you feel overall about BART nowadays -- not just your life here at home but other things too like taxes, travel and anything else that occurs to you, how happy or unhappy are you that BART was built? (IF NEEDED: Very happy, fairly happy, fairly unhappy, or very unhappy?) CODE IN SECOND COLUMN.

	A Effect on life at home	B Overall feeling
Very happy	37/ 1	38/ 1
Fairly happy	2	2
Half and half, can't choose	3	3
Fairly unhappy	4	4
Very unhappy	5	5
No effect	6	6

C. How do your feelings now compare with the way you felt when BART first started running here -- would you say you felt better at the beginning, or worse at the beginning? (IF BART ALREADY RUNNING WHEN R MOVED HERE: How do your feelings now compare with the way you felt when you first moved here?)

Felt better at first	39/ 1
Felt worse at first	2
Same, no change	3

D. IF OTHER ADULT(S) IN HOUSEHOLD: How do you think your attitudes about BART compare with the way (the other person) (any/either of the other people) in your household feel(s)? Would you say that (he) (she) (they) feel(s) very much as you do, somewhat the same as you do, a little different, or very different from the way you do? (PRIORITY CODE DIFFERENT)

Very much the same	40/ 1
Somewhat the same	2
A little different	3*
Very different	4*

*E. IF ANYONE IN HOUSEHOLD FEELS DIFFERENT (A LITTLE OR VERY DIFFERENT): Would you say (he/she is) (they are) very happy, fairly happy, fairly unhappy, or very unhappy overall that BART was built?

Very happy	41/ 1
Fairly happy	2
Fairly unhappy	3
Very unhappy	4

20. Based on your experience living here, do you think it would or would not have been worth an extra dollar or two a month to have BART tracks underground where they're close to your home?

Yes, worth it 42/ 1

No, not worth it 2

21. A. Here's a list of different things people might do to try to accomplish something. As I read each one, please tell me whether (any of) (either of) you have ever done that either in support of something BART was doing, or to try to get something about BART changed?

	Yes, did <u>pro-BART</u>	Yes, did <u>anti-BART</u>	No, have <u>not done</u>
(1) Did (either of/any of) you file a lawsuit having to do with BART?	43/ 1#	2#	3
(2) Did (either of/any of) you organize an action group concerned with BART?	44/ 1#	2#	3
(3) Did (either of/any of) you vote for a candidate for public office because of his or her views about BART?	45/ 1#	2#	3
(4) Did (anyone) (you) draw up a petition about it?	46/ 1#	2#	3
(5) Did (anyone) (you) write to a newspaper about BART?	47/ 1#	2#	3
(6) Did (either of/any of) you write to or telephone a public figure?	48/ 1#	2#	3
(7) Did anyone sign a petition having to do with BART?	49/ 1#	2#	3
(8) Have (either of/any of) you attended a meeting about BART?	50/ 1#	2#	3
(9) Have (either of/any of) you ever talked to your neighbors about things that you thought were good or bad about BART?	51/ 1	2	3
(10) Is there anything else that (either of/any of) you did or tried to do either for or against BART?	52/ 1#	2#	3

- #B. IF YES TO ITEM 1 - 8 OR 10, ASK FOR EACH: Exactly what was it that you wanted to accomplish (then) (that time)? IF MORE THAN ONE ACTION TAKEN, IDENTIFY EACH BELOW BY NUMBER.

53-57

--	--	--	--	--

58-61

--	--	--	--	--

22. Now let's talk about BART away from your home and immediate neighborhood. We're especially interested in knowing how much information most people have picked up about BART.

A. So far as you know, is there a BART station at (EACH PLACE LISTED)?

	Yes	No	Don't know
Fremont	4/ 1	2	3
San Jose	5/ 1	2	3
Richmond	6/ 1	2	3
Vallejo	7/ 1	2	3
Hayward	8/ 1	2	3
Concord	9/ 1	2	3
Daly City	10/ 1	2	3
Palo Alto	11/ 1	2	3
Downtown Berkeley	12/ 1	2	3
Livermore	13/ 1	2	3

- B. Do you find that you've become more aware of different parts of the Bay Area because BART was built, or hasn't that had any effect on what you notice? (IF DID NOT LIVE IN AREA THEN: . . . because of BART being there?)

Yes, more aware. 14/ 1*

No, no difference (SKIP TO D) . . . 2

*C. IF YES, MORE AWARE: What are some of the places you're more aware of now?

15-18/

- D. ASK ALL: As you think about the whole Bay Area not counting your neighborhood, would you say that BART is a part of the landscape that you tend to notice a lot, a little, or not at all?

Yes, notice a lot 19/ 1

Yes, notice a little 2

No, not at all 3

- E. When it comes to overall appearance or how it looks from the outside, would you say that BART generally looks very good, fairly good, fairly bad, or very bad?

Very good 20/ 1

Fairly good 2

Fairly bad 3

Very bad 4

23. A. How often do you notice anything at all about BART when you're travelling around the Bay Area either by car, by bus, or any other way except BART — either BART stations, BART lines, or anything else about BART. Would you say you notice BART almost every day, at least once a week, at least once a month, or less often than that? Please count only when you're traveling, not when you're at a particular place.

Almost every day 21/ 1*
 At least once a week 2*
 At least once a month (SKIP TO Q 24) 3
 Less than once a month (SKIP TO Q 24) 4

*IF AT LEAST ONCE A WEEK:

B. Here are some things which you may or may not notice much about BART. As I read each one, tell me whether you often, sometimes, rarely or never notice it when you're travelling around the Bay Area. HAND BLUE CARD D. How about (EACH ITEM)?

	<u>Often notice</u>	<u>Sometimes notice</u>	<u>Rarely notice</u>	<u>Never notice</u>
(1) The design or appearance of the stations 22/	1	2	3	4
(2) Directional signs pointing the way to BART 23/	1	2	3	4
(3) The design or appearance of BART cars 24/	1	2	3	4
(4) Design or appearance of the elevated tracks 25/	1	2	3	4
(5) Noise of the trains 26/	1	2	3	4
(6) Traffic at stations 27/	1	2	3	4
(7) Cars parked at or near BART 28/	1	2	3	4
(8) Lights at the stations at night . . 29/	1	2	3	4
(9) The changes they've made in the downtown streets and sidewalks in Oakland, Berkeley or San Francisco 30/	1	2	3	4
(10) Anything else you're likely to notice? (SPECIFY: _____ 31/	1	2	3	4

C. IF ANY ITEM NOTICED OFTEN (CODE 1): You said you often notice (ALL ITEMS CODED 1). (IF MORE THAN ONE: Which, if any, of these things are you especially happy about? Any others?) (IF ONLY ONE: Is that something you're especially happy about or not?)

Especially happy about items: _____ [] None

D. And which, if any, are you especially unhappy about? READ REMAINING ITEMS CODED 1.

Especially unhappy about: _____ [] None

32-36					37-41				
42-46					47-51				

24. A. How about when you're at work, shopping, at school or any other place away from home that you're at often -- how often do you notice anything at all about BART then? (Almost every day, at least once a week, at least once a month, or less often than that?)

Almost every day	4/	1*	
At least once a week		2*	
At least once a month		3	} SKIP TO Q 25
Less than once a month		4	
No such regular activities		5	

*IF AT LEAST ONCE A WEEK:

- B. (Here are some things which you may or may not notice much about BART). When you're (there) (in any of these places), do you often, sometimes, rarely or never notice each of these things? Please do not count times when you're in a BART station or BART train. Just pick your answer off (this) (the same) card. BLUE CARD D. How about (EACH ITEM)?

		Often <u>notice</u>	Sometimes <u>notice</u>	Rarely <u>notice</u>	Never <u>notice</u>
(1) The design or appearance of the stations	5/ 1		2	3	4
(2) Directional signs pointing the way to BART	6/ 1		2	3	4
(3) The design or appearance of BART cars	7/ 1		2	3	4
(4) Design or appearance of the elevated tracks	8/ 1		2	3	4
(5) Noise of the trains	9/ 1		2	3	4
(6) Traffic at stations	10/ 1		2	3	4
(7) Cars parked at or near BART	11/ 1		2	3	4
(8) Lights at the stations at night	12/ 1		2	3	4
(9) The changes they've made in the downtown streets and sidewalks in Oakland, Berkeley or San Francisco	13/ 1		2	3	4
(10) Anything else you're likely to notice? (SPECIFY: _____)	14/ 1		2	3	4

- C. IF ANY ITEM NOTICED OFTEN (CODE 1): You said you often notice (ALL ITEMS CODED 1). (IF MORE THAN ONE: Which, if any, of these things are you especially happy about? Any others?) (IF ONLY ONE: Is that something you're especially happy about or not?)

Especially happy about items: _____ [] None

- D. And which, if any, are you especially unhappy about? READ REMAINING ITEMS CODED 1.

Especially unhappy about: _____ [] None

15-19					20-24				
25-29					30-34				

25. ASK ALL: Now some questions about your use of BART.

A. CODE IN EVERY CASE, ASKING IF NOT CLEAR: Have you ever ridden BART?

Yes 35/ 1*

No (SKIP TO Q 26) 2

*IF YES:

B. Do you consider yourself a fairly regular user of BART?

Yes 36/ 1

No 2

C. During the past month (30 days), about how many round trips did you take on BART?

[] None Took about _____ round trips 37-38/

26. ASK ALL EXCEPT THOSE WHO LIVE ALONE:

[] Lives alone.

SKIP TO Q 27.

Now about (IF 2 OR MORE OTHERS: the others here in your household)

(IF ONLY ONE OTHER: your _____) -- During the past month (30 days)

about how many round trips (have they) (has he/she) made (on their/his/her own)?

This does not include you.

[] None Took about _____ round trips (TOTAL FOR ALL PERSONS IN
HOUSEHOLD EXCEPT R)

39-40/

27. ASK ALL: Which BART station would you go to from here to get on a BART train? (IF
DEPENDS ON DESTINATION: Considering the places you go to most often, which BART
station would you go to?)

ENTER STATION CODE: _____

[] Unable to name or locate

13- Fremont

01- Concord

07- Richmond

26- Daly City

14- Union City

02- Pleasant Hill

08- El Cerrito

27- Balboa Park

15- South Hayward

03- Walnut Creek

del Norte

28- Glen Park

16- Hayward

04- Lafayette

09- El Cerrito

29- Mission-24th

17- Bayfair

05- Orinda

Plaza

30- Mission-16th

18- San Leandro

06- Rockridge

10- North Berkeley

31- Civic Center

19- Coliseum

11- Berkeley

32- Powell

20- Fruitvale

12- Ashby

33- Montgomery

21- Lake Merritt

22- MacArthur

34- Embarcadero

23- Oakland-19th

24- Oakland-12th

25- West Oakland

41-42/

(Cd 5)

28. A. In choosing a place to live, did you try to find a home where you could easily get to a BART station by walking, bus or car?

Yes, at least tried 43/ 1
No, did not try 2
DNA. Lived here before BART 3

B. ASK ALL: How well has BART met your expectations as a means of transportation? (Even though you don't use or need BART, we're still interested in your reactions.) (Would you say it's much better than you expected, a little better, just about what you expected, a little worse, or much worse than you expected?)

Much better than expected 44/ 1
A little better than expected . . . 2
About as expected 3
A little worse than expected . . . 4
Much worse than expected 5
Can't begin to answer. Never
thought what to expect 6

29. A. Have you seriously considered moving away from here in the last few years?

Yes 45/ 1*
No (SKIP TO Q 30) 2

*IF YES:

B. What were your reasons? RECORD VERBATIM, PROBING FOR CLARIFICATION. THEN CODE BELOW.

Mentioned BART (SKIP TO Q 30) . . . 46/ 1
Did not mention BART 2#

#C. IF BART NOT MENTIONED AS REASON:

Was BART part of the reason?
Yes 47/ 1
No 2

(Cd 5)

30. ASK ALL:

A. Do you know of anyone (else) who has moved or considered moving away from this neighborhood because of BART?

Yes 48/ 1

No 2

B. And do you know of anyone (else) who has moved into this neighborhood because of BART?

Yes 49/ 1

No 2

31. CODE IN EVERY CASE, ASKING IF NOT COMPLETELY CLEAR:

A. Is your home built mainly of wood or some kind of masonry like brick, concrete or stone?

Wood or stucco 50/ 1

Brick, concrete, stone,
other masonry 2

Other (SPECIFY: _____) 3

B. What floor or story do you live on? (IF TWO OR MORE FLOORS OCCUPIED:
Which is the highest floor or story you use for living space?)

Highest story used by R's household:

1st 2nd 3rd 4th [] Other (SPECIFY: _____)

[] Single family house, all on one floor 51-52/

32. Now some questions about you [and the others/other person who live(s) here in this household.] Starting with the oldest, I'd like a list of everyone who lives here -- including babies, lodgers, and anyone who normally lives here but is away right now. (I don't need names).

	_____yrs	_____yrs	_____yrs	_____yrs	_____yrs	_____yrs	_____yrs
A. How old was the (oldest)(next oldest) person on his or her last birthday?	[] Male [] Female	[] Male [] Female	[] Male [] Female	[] Male [] Female	[] Male [] Female	[] Male [] Female	[] Male [] Female
B. Is (PERSON) a (man/boy) or a (woman/girl)	_____hrs	_____hrs	_____hrs	_____hrs	_____hrs	_____hrs	_____hrs
C. AFTER ALL PERSONS LISTED ABOVE, ASK C: In order to understand how people are affected by BART, other traffic, and other things that happen in the neighborhood, we need to know how much time people are at home and when. About how many hours would you say (EACH PERSON) spends away from your home and its surroundings on the average weekday? (IF VARIES: How about most days?) (IF ANY PROBLEM: Would you say PERSON is away no more than 2 hours a day, about 3 or 4 hours, about 5 or 6 hours, from 7 to 9 hours, or more than 9 hours?)	[] 12 hrs or less [] 13 or 4 [] 15 or 6 [] 17 - 9 [] More than 9 hrs	[] 12 hrs or less [] 13 or 4 [] 15 or 6 [] 17 - 9 [] More than 9 hrs	[] 12 hrs or less [] 13 or 4 [] 15 or 6 [] 17 - 9 [] More than 9 hrs	[] 12 hrs or less [] 13 or 4 [] 15 or 6 [] 17 - 9 [] More than 9 hrs	[] 12 hrs or less [] 13 or 4 [] 15 or 6 [] 17 - 9 [] More than 9 hrs	[] 12 hrs or less [] 13 or 4 [] 15 or 6 [] 17 - 9 [] More than 9 hrs	[] 12 hrs or less [] 13 or 4 [] 15 or 6 [] 17 - 9 [] More than 9 hrs
D. Is (PERSON) usually at home between (EACH TIME PERIOD)? CODE ALL THAT APPLY	[] 14 - 7AM [] 7 - 9AM [] 9 - 4PM [] 4 - 7PM [] 7 - 10PM [] 10PM - 1 AM	[] 14 - 7AM [] 7 - 9AM [] 9 - 4PM [] 4 - 7PM [] 7 - 10PM [] 10PM - 1 AM	[] 14 - 7AM [] 7 - 9AM [] 9 - 4PM [] 4 - 7PM [] 7 - 10PM [] 10PM - 1 AM	[] 14 - 7AM [] 7 - 9AM [] 9 - 4PM [] 4 - 7PM [] 7 - 10PM [] 10PM - 1 AM	[] 14 - 7AM [] 7 - 9AM [] 9 - 4PM [] 4 - 7PM [] 7 - 10PM [] 10PM - 1 AM	[] 14 - 7AM [] 7 - 9AM [] 9 - 4PM [] 4 - 7PM [] 7 - 10PM [] 10PM - 1 AM	[] 14 - 7AM [] 7 - 9AM [] 9 - 4PM [] 4 - 7PM [] 7 - 10PM [] 10PM - 1 AM

33. Now just a few background questions about you, and I'll be all through.

A. Where did you live when you were growing up -- in the country, in a small town, or in a city or suburb of a large city? CIRCLE ONE CODE IN FIRST COLUMN.

B. And during most of your adult life, did you live in that same kind of place or some other kind of place? (Did you spend most of your adult life on a farm or elsewhere in the country, in a small town, or in a city or suburb of a large city?) CIRCLE ONE CODE IN SECOND COLUMN.

	A	B
	Growing up	Adult years
Farm or in country	53/ 1	54/ 1
Small town	2	2
City or suburb of city . .	3	3

34. What was the highest year or grade you completed in school or college?

8th grade or less	55/ 1
Some high school	2
High school graduate	3
Some college (including junior college graduate)	4
College graduate	5
Graduate degree	6

35. Do you have any physical problems which make it very hard for you to see, hear, or get out of the house? (IF NEEDED: What sort of trouble is that?)

Seeing - Blind	56/ 1
Other seeing problem (SPECIFY: _____)	2
Deaf	3
Other hearing problem (SPECIFY: _____)	4
Cannot walk well enough to leave house . . .	5
Other walking problem (SPECIFY: _____)	6
Other problem (SPECIFY: _____)	7

36. Noise bothers some people more than others. How about you? Would you say that you're much more bothered by noise than most people, a little more bothered, a little less bothered, or much less bothered by noise than most people?
- | | |
|--|-------|
| Much more bothered than most | 60/ 1 |
| A little more bothered | 2 |
| About the same as most | 3 |
| A little less bothered | 4 |
| Much less bothered than most | 5 |
-
37. There's a lot of talk these days about air and water pollution control and things like that. How much emphasis do you think the Government should place on protecting the environment -- more than it is now, less than now, or about the same?
- | | |
|----------------------------------|-------|
| More emphasis than now | 61/ 1 |
| Same | 2 |
| Less emphasis than now | 3 |
-
38. At the present time, are you married, widowed, separated or divorced, or have you never been married?
- | | |
|---------------------------------|-------|
| Married | 62/ 1 |
| Widowed | 2 |
| Separated or divorced | 3 |
| Never married | 4 |
-
39. All things considered, how would you feel about moving away from this neighborhood -- is it something that would make you very happy, somewhat happy, somewhat unhappy or very unhappy?
- | | |
|----------------------------|-------|
| Very happy | 63/ 1 |
| Somewhat happy | 2 |
| Somewhat unhappy | 3 |
| Very unhappy | 4 |
-
40. Do you think of yourself as having a lot of power to influence or change things you don't like about the way the world treats you, some power, only a little, or none at all?
- | | |
|-----------------------------|-------|
| A lot of power | 64/ 1 |
| Some power | 2 |
| Very little power | 3 |
| None at all | 4 |

41. If someone asked you what race or ethnic group or nationality you belonged to, how would you describe yourself? (IF "AMERICAN": Where did your family come from originally?) (IF NEEDED: Where did most of your ancestors come from?)

-
42. Last, which letter on this card (HAND PINK CARD E) comes closest to your household's total income before taxes in 1975?

A. Less than \$4,000	65/ 1
B. \$4,000 - \$6,999	2
C. \$7,000 - 9,999	3
D. \$10,000 - 14,999	4
E. \$15,000 - 19,999	5
F. \$20,000 - 24,999	6
G. \$25,000 and up	7

43. Is there anything else you think we should know or any other questions you think I should have asked? (What?)

44. We may want to come back and talk with you again in a few months. RECORD VERBATIM ANY COMMENTS AND CODE BELOW.

Clearly willing 66/ 1
No objection, but no enthusiasm . 2
Clearly not willing 3

- A. What would be the most convenient time for us to see you if we should come back?

Day(s) _____

Time(s) _____

- B. If you should move, who would always know where you are? PROBE FOR CORRECT SPELLING, ADDRESS, PHONE NUMBER, AND RELATIONSHIP.

NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____

TELEPHONE NUMBER: () _____

RELATION TO RESPONDENT: _____

-
45. From time to time the office gets in touch with people we've interviewed to make sure that we're handling our jobs correctly. May I (have) (check) your name, address and telephone number? PRINT CLEARLY.

NAME: _____ TELEPHONE: _____

ADDRESS: _____ CITY: _____

-
46. RECORD TIME INTERVIEW ENDED: _____ A.M.
P.M.

THANK AND TERMINATE

INTERVIEWER OBSERVATIONS

(TO BE COMPLETED IMMEDIATELY AFTER LEAVING RESPONDENT)

A. Respondent's sex

Male 1
Female 2

B. Race or ethnicity:

White, Caucasian 1
Chicano, Mexican-American 2
Black, Negro 3
Other (SPECIFY: _____) 4
_____ 4

C. R's cooperativeness in interview:

Very cooperative 1
Fairly cooperative 2
Not cooperative 3
Openly hostile 4

D. R's comprehension of questions (in language used in interview):

Excellent 1
Average 2
Had difficulty 3

E. Type of structure in which HU located:

Single family house 1
Duplex or triplex 2
Apartment house 3
Other (SPECIFY: _____) 4

F. Condition of structure:

Very good 1
Average 2
Poor or dilapidated 3

G. Orientation of front windows of HU to nearest part of BART:

Faces BART 1
Faces away from BART 2
Other (SPECIFY: _____) 3
_____ 3

H. Did R have any obvious kind of physical disability or problem?

No, none observed 1
Yes (SPECIFY: _____) 2
_____ 2

I. Thumbnail (PLEASE USE SPACE BELOW TO TELL US ANYTHING ABOUT R OR THE INTER- VIEW THAT MIGHT HELP US TO UNDERSTAND THE INTERVIEW)

I. Date of Interview: _____, 1976

J. Interviewer's signature: _____

APPENDIX 3

STATISTICAL SIGNIFICANCE

We have found it useful in comparisons of whole sites and also in comparisons between first stratum respondents in different sites to employ approximate rules of thumb regarding the magnitude of differences between sites that reflect the operation of more than chance factors. Because we are examining a sample of responses, we recognize that merely by chance some differences will be observed. Taking the design of the sample into account, we have made a number of calculations to provide a basis for deciding whether observed differences may be judged significantly different from those which would naturally arise in the random sampling process.

We consider first the standard errors of the proportion giving a particular response, then of the differences between site-proportions, for whole sites and for first stratum respondents. Finally, we consider the substantial importance of consistent differences in a set of comparisons.

The reader uninterested in statistical details may wish simply to note our conclusions. For whole site comparisons we estimate that differences of ten to 22 percentage points, depending upon the particular pair of sites, are significant at the five percent level except in a comparison of Sites 5 and 8 (Albany-West and San Leandro) where the difference must reach 25 percentage points. Those figures take into account the design of the sample, including the substantial correlation between impact and closeness to BART.

For first stratum comparisons, differences of 13 to 24 percentage points are significant at the ten percent level, a criterion more appropriate than the five percent level for the relatively small samples of respondents interviewed in those first strata. The latter figures apply to characteristics that are evenly divided in the population (50 percent in each of two categories). For unevenly divided characteristics, smaller differences will suffice. If a characteristic is divided 80 percent and 20 percent in the population, for instance, first stratum differences need not exceed 11 to 20 percentage points, depending on the particular pair of sites being compared.

No standard tests take full account of the frequently observed consistency of the differences in two or more such comparisons. The sign test provides a minimal criterion: four independent comparisons (pairs of sites) must have the same sign to reach a ten percent level of significance, and five out of five must have the same sign to reach a five percent level of significance. A brief examination of the probabilities of actual magnitudes of differences indicates that these are very conservative criteria. Given the standard errors that we estimate for first stratum proportions, two differences of 15 percentage points would be significant at the ten percent level, as would three differences of 11 percentage points. If a one-tailed

testing procedure is followed, appropriate in the many instances where a clear prior prediction can be made, the requisite differences would be reduced by a factor of two or more. As a consequence, we have emphasized consistent patterns of difference when they were observed.

WHOLE SITE COMPARISONS

The first set of calculations is shown in Table 1. Because nearly all of our analyses consist of examinations of proportions rather than other statistics, the figures in Table 1 show the standard error of a proportion for each site. The figures in column 5 of Table 1 are a reasonable estimate of the standard error of a proportion, for each site, given the stratified sample design. They are the basis of the calculations in Table 2.

Table 1
WHOLE SITE, STANDARD ERROR OF PROPORTION

Site	Assuming No Variation in Stratum Weights ¹	Using Actual Stratum Weights ¹	Assuming No Variation in Stratum Weights, But Using Actual Sampling Ratios ¹	Using Actual Stratum Weights & Actual Sampling Ratios ¹	Using Actual Weights, Actual Sampling Ratios, and Correlated Criterion ²
1	.071	.073	.065	.069	.062
2	.053	.059	.047	.055	.039
3	.049	.052	.038	.043	.036
4	.046	.055	.040	.053	.050
5	.075	.100	.063	.096	.090
6	.069	.077	.062	.072	.060
7	.051	.054	.041	.045	.041
8	.071	.092	.060	.088	.087
9	.070	.075	.066	.072	.063
10	.071	.079	.064	.075	.046
Column	1	2	3	4	5

¹Assuming maximally variant criterion uncorrelated with strata ($P=.5$ for each stratum).

²Using "notice BART noise inside home" as a measure of impact, this figure takes account of the gain in precision when the criterion (here impact) is correlated with the basis for stratification (distance from BART). (The observed proportions were used to estimate this correlation in the population.)

The preceding columns in Table 1 show the effect of different elements in the design. While column 5 takes account of the correlation between impact of BART and distance from BART, which was the basis for stratification and is further discussed below, columns 1 - 4 do not. Instead, they assume a maximally varying criterion uncorrelated with distance from BART (probability of occurrence one-half in each stratum). Column 1 is the standard error that would be obtained for an unstratified sample of the same size, equivalent to simple random sampling. Column 2 takes into account the fact that the actual proportion of completed interviews in each stratum is somewhat different from the proportion of the site population in that stratum. This factor slightly increases the variability for each site.

Column 3 takes into account a factor that reduces the variability for each site: the number of completed interviews in each stratum was a sizeable proportion of the population in that stratum. For these purposes we take an interview to represent a household, since the population of households rather than persons was enumerated for these purposes. Because of this factor, each figure in column 3 is slightly (and in a few cases substantially) lower than the figure in column 1 for that site.

Column 4 takes both of these factors into account. Once again, the variation in weights over the different strata results in the figures in column 4 being somewhat larger than in the corresponding figures in column 3, for the same reason that those in column 2 exceed column 1.

Finally, column 5, as noted, takes account of the fact that the basis for stratification, distance from BART, is correlated with many of the impact variables being assessed. For this purpose we have taken the observed proportions of respondents in each stratum who report noticing noise from BART inside their home as estimates of the corresponding proportions in the population. Those estimated population proportions permit the calculation of an estimated standard error of a proportion that reflects this systematic relation between variability and distance from BART. Each of the figures in column 5 is correspondingly lower than each of the corresponding figures in column 4 because of this factor.

In sum, the aggregate effect of these different design factors yield standard errors that are in most cases smaller than those which would have been obtained by simple random sampling over the whole site (comparing columns 1 and 5), though in a few cases (Sites 4, 5, and 8) they are larger because of the stratum weights employed in those sites. Those weights reflect the design decision discussed earlier emphasizing the selection of respondents from the first stratum even where the proportion of the population in that first stratum was somewhat smaller than in other strata. That decision, in turn, recognizes the importance to the analysis of separate investigation of the perceptions of first stratum residents.

Employing the figures in column 5 of Table 1 as a reasonable estimate of the sampling variability of a proportion for each site, the values presented in Table 2 show the minimum extent to which the proportions for two sites

must differ in order to be a safe indication that the difference did not arise through chance factors in the selection of the sample. They are, in other words, the differences, for each pair of sites, that are just significant at the five percent level, a conventional statistical criterion for reasonably large samples.

Table 2
WHOLE SITES: DIFFERENCES IN PROPORTIONS SIGNIFICANT AT FIVE PERCENT
LEVEL FOR EACH POSSIBLE PAIR OF SITES

		First Site								
		Daly City 1	Rich- mond 2	El Cerrito 3	Albany East 4	Albany West 5	Oak- land 6	Con- cord 7	San Leandro 8	Hayward North 9
Second Site										
2	Richmond	.144								
3	El Cerrito	.141	.104							
4	Albany East	.156	.124	.121						
5	Albany West	.214	.192	.190	.202					
6	Oakland	.169	.140	.137	.153	.212				
7	Concord	.146	.111	.107	.127	.194	.142			
8	San Leandro	.209	.187	.185	.197	.245	.207	.189		
9	Hayward North	.173	.145	.142	.158	.215	.171	.147	.211	
10	Hayward South	.151	.118	.114	.133	.198	.148	.121	.193	.153
				Significance Value of Tabulated	In a Comparison of Sites Numbered					
Largest				.245	5 & 8		(.255)*			
				.215	5 & 9		(.266)*			
				.214	5 & 1					
				.212	5 & 6					
				.211	8 & 9					
				.						
				.						
				.						
				.118	10 & 2					
				.114	10 & 3					
				.111	2 & 7					
				.107	3 & 7					
Smallest				.104	2 & 3					

*The significance value for a criterion maximally variant ($P=.5$) and uncorrelated with the strata.

Examination of Table 2 shows that except for a comparison of Sites 5 and 8, a difference of 20 percentage points in nearly all cases is a good indication that the differences did not arise by chance. For a comparison of Sites 5 and 8 the difference would have to be 25 percentage points. For many comparisons, such as between Sites 2 and 3, or Sites 3 and 7, or 2 and 7, a difference of 10 to 11 percentage points would suffice to reject the null hypothesis.

FIRST STRATUM COMPARISONS

In many of the analyses we were interested in comparing first stratum respondents in one site with those in another. The calculations in Table 3 provide a basis for assessing sampling variability in such comparisons. For first stratum analyses, the simple random sampling (SRS) model needs modification only to the extent that the sample represents a sizeable proportion of the population. Taking this factor into account reduces the variability for each site, as can be seen from a comparison of columns 1 and 2 in Table 3.

Table 3
FIRST STRATUM, STANDARD ERROR OF PROPORTION

Site	Using Actual Sampling Ratios		
	SRS ¹	1	2
1 Daly City	.109	.099	.079
2 Richmond	.085	.068	.055
3 El Cerrito	.079	.063	.050
4 Albany East	.079	.053	.046
5 Albany West	.091	.071	.057
6 Oakland	.115	.098	.079
7 Concord	.081	.059	.048
8 San Leandro	.109	.075	.060
9 Hayward North	.115	.103	.083
10 Hayward South	.115	.101	.081
Column	1	2	3

¹Maximally variant criterion ($P=.5$).

²Assuming the event (e.g., impact is perceived) occurs 80 percent of the time, or 20 percent).

The figures in column 2 are conservative, in that they assume an even split in the population for the characteristic being analyzed. As estimated from our sample results, many characteristics are less evenly distributed in the population, and so we have calculated in column 3 the standard error of a proportion for a characteristic that is split 80 - 20 in the population. Such characteristics would always have less sampling variability, as is clear from a comparison of columns 2 and 3.

Using the more conservative figures in column 2 as a basis for calculating how large a difference between the first stratum proportions for two sites would have to be in order to satisfy the five percent criterion yields the values shown in Table 4 for each pair of sites. Because the first stratum samples were necessarily quite small, never exceeding 40 cases and being fewer than 22 cases in five of the ten sites, a fairly large difference is required to reject the null hypothesis. For a characteristic that is split 50 - 50 in the populations of Sites 9 and 10, nearly 30 percentage points (28.3) would be required for significance at the five percent level. Differences of a similar order would be required in comparisons of Sites 1 and 9, 1 and 10, and a few other comparisons.

On the other hand, a difference as small as 16 percentage points would suffice to reject the operation of chance factors in a comparison of the first strata of Sites 4 and 7, even in this "worst" case where the population characteristics were evenly split.

For population characteristics that are not evenly split, smaller differences would suffice to suggest nonrandom factors operating. If the population were split 80 - 20 in Sites 9 and 10, for instance, 23 percentage points, rather than 28, would be sufficient to reject the null hypothesis.

In working with samples as small as 20 it is generally unwise to employ a criterion as stringent as the five percent level of significance. In employing so stringent a criterion with relatively small samples, one will frequently incorrectly accept the null hypothesis that only chance factors are operating when in fact there are systematic reasons for the observed difference. Such analyses of the implications of a statistical testing procedure are often discussed in terms of the "power of a test." While we have not gone into a detailed analysis of the power of the testing procedure we have used, we do believe that there is merit in this point of view, and that a ten percent rather than five percent level of significance may be more appropriate for many of the first stratum comparisons, particularly when they involve Sites 1 (Daly City), 6 (Oakland), 8 (Hayward North), 9 (San Leandro) and 10 (Hayward South) where the first stratum sample is 21 or less.

Analysis of the implications of following this less stringent criterion, both in cases where the population characteristic is maximally variant (i.e., contains a 50 - 50 split) and where the variation is less (i.e., an 80 - 20 split) is shown in Table 5. This table shows comparisons requiring a relatively large difference as well as those requiring a minimal difference to achieve statistical significance. The first column of Table

5 repeats the values reported in Table 4, while the second column shows how these are reduced when a ten percent significance level is employed. The third and fourth columns present similar results for a population characteristic with an 80 - 20 split.

In sum, first stratum comparisons may be judged significant at the ten percent level, for population characteristics that are about evenly distributed, where the proportions differ by from 13 to 24 percentage points. For less evenly divided population characteristics, 11 to 20 percentage points is sufficient.

Table 4

FIRST STRATUM COMPARISONS

DIFFERENCES IN PROPORTIONS SIGNIFICANT AT FIVE PERCENT LEVEL¹

	First Site	Rich-	El	Albany	Albany	Oak-	Con-	San	Hayward
	Daly	mond	Cerrito	East	West	land	cord	Leandro	North
	1	2	3	4	5	6	7	8	9
Second Site									
2 Richmond	.235								
3 El Cerrito	.230	.182							
4 Albany East	.220	.169	.161						
5 Albany West	.239	.193	.186	.174					
6 Oakland	.273	.234	.228	.218	.237				
7 Concord	.226	.176	.169	.155	.181	.224			
8 San Leandro	.243	.198	.192	.180	.202	.242	.187		
9 Hayward North	.280	.242	.237	.227	.245	.279	.233	.250	
10 Hayward South	.277	.239	.233	.224	.242	.276	.229	.247	.283
	Significance								
	Value						Comparing		
							Site Number		
Largest	.283						9 & 10		
	.280						9 & 1		
	.277						10 & 1		
	.276						10 & 6		
	.								
	.								
	.169						4 & 2		
	.169						3 & 7		
	.161						4 & 3		
Smallest	.155						4 & 7		

¹Takes sampling ratios into account.

²For a ten percent rather than five percent significance level.

Table 5
FIRST STRATUM COMPARISONS
SIGNIFICANT DIFFERENCES IN PROPORTIONS UNDER DIFFERENT CIRCUMSTANCES

Comparison	Population Split 50 - 50		80 - 20	
	Significance Level		5%	10%
	5%	10%		
Sites 9 & 10 (largest)	.283	.237	.227	.191
Sites 9 & 1	.280	.235	.225	.188
Sites 10 & 1	.277	.233	.222	.186
Sites 10 & 6	.276	.232	.222	.186
.				
Sites 4 & 2	.169	.142	.141	.118
Sites 3 & 7	.169	.142	.136	.114
Sites 4 & 3	.161	.135	.133	.112
Sites 4 & 7 (smallest)	.155	.130	.130	.109

CONSISTENT DIFFERENCES

The preceding considers comparisons only between a pair of sites. Further plausibility is lent to the conclusion that more than chance is operating if similar results are observed for more than one comparison. This would be the case if similar results were found in comparing Sites 1 and 2 as well as Sites 3 and 4, for instance.

Using the simple sign test, probabilities may be assigned to the joint occurrence of similar results in several independent comparisons. By similar results, we mean results in which the direction of difference is the same over all comparisons. In each case, for instance, aerial sites may produce more noticeable impact than at-grade sites.

The sign test is useful in suggesting rules of thumb when analyzing sets of comparisons, but because it is sensitive only to the direction of the difference it should be viewed as a very conservative criterion. Even though results do not satisfy the criterion suggested by this test, they may have occurred for systematic reasons. As discussed below, a more sensitive test, one which takes into account the magnitude as well as the sign of the differences, would more often show such results to be significant. Unfortunately, a more sensitive test is not readily available, because of the numerous calculations required for each comparison, and we can only sketch such a test to illustrate its conclusions.

In order that these comparisons be independent, it is necessary that they be made between different sites. To determine the probabilities of occurrence of non-independent comparisons, as in a contrast of Sites 1 and 2 with Sites 1 and 3, is a more complicated problem that we choose not to address.

The probabilities shown in Table 6 indicate that the joint occurrence of two similar results in two comparisons has one of four chances of occurring. This is insufficient, even when using a ten percent significance level, to reject the hypothesis that observed consistency arose through chance factors. The same is true for three consistent results in three independent comparisons.

Table 6
APPLICATION OF THE SIGN TEST (BINOMIAL PROBABILITIES, $P=1/2$)
FOR ASSESSING PATTERNS OF SIMILAR RESULTS OVER INDEPENDENT COMPARISONS

Total Number of Independent Comparisons	Number of Similar Results	Probability of Obtaining This Many Or More Similar Results	Sufficient to Reject Chance	
			5%	10%
2	2	.25	No	No
3	2	.50	No	No
3	3	.125	No	No
4	3	.31	No	No
4	4	.06	No	Yes
5	3	.50	No	No
5	4	.19	No	No
5	5	.03	Yes	Yes
6	4	.34	No	No
6	5	.11	No	Yes ¹
6	6	.02	Yes	Yes
7	5	.23	No	No
7	6	.06	No	Yes
7	7	.01	Yes	Yes

¹Actually at 11 percent level of significance, not inappropriate for small samples.

Four consistent results in four comparisons is, on the other hand, a reasonably good indication of something other than chance when one is working with a ten percent level of significance, as are five out of five and five (or six) out of six comparisons.

When employing a five percent level of significance, five fully consistent comparisons are required to reject the null hypothesis, and no fewer than six out of six or seven out of seven. Other possibilities and their associated decision rules are shown in Table 6.

We noted earlier that this sign test is not sensitive to the magnitude of a difference. It is based on the simple idea that if only chance factors are operating then the likelihood of a positive difference, in any one comparison, is equal to the likelihood of a negative difference, similar to flipping a coin. Each separate comparison is like the flipping of another coin. While a test that is sensitive to the magnitude of differences is not available, a sketch of such a test shows how insensitive the sign test is.

Taking the largest standard error, 0.103 (the value for Site 9), of a first stratum proportion under the conservative assumption of a 50 - 50 distribution in the population, assume for simplicity that a comparison is being made between two first stratum proportions with this same standard error. Then the standard error of the difference between those proportions, the square root of the sum of squares of their separate standard errors, is .146. Assuming that the sampling distribution of these differences is a normal distribution (which is reasonable for samples of 20), then there are 32 chances out of 100 of observing a difference as large as or larger than 1.00 times .146 or .146 in either direction. (The value of 1.00 comes from a table of the normal distribution, assuming a two-sided testing procedure.) If those two comparisons were independent then the joint occurrence of those two events would have the probability of $.32^2 = .10$ and be significant at the ten percent level of significance.

Making conservative assumptions throughout, in other words, two first stratum differences of the order of 15 percentage points would lead one to suspect that more than chance is operating. By a similar line of reasoning, the observation of three differences, each with a magnitude of about 11 percentage points, would again lead to a rejection of the null hypothesis at the ten percent significance level.

These calculations are based on the "worst" case, that where the standard error of the first stratum proportion is the greatest. If one considered the smallest standard error, the same reasoning would lead to rejection of the null hypothesis upon observing two independent comparisons where the magnitude of the difference was about eight percentage points, or three where the difference was about six percentage points.

Further, these calculations are based on a two-sided testing procedure. One-sided testing procedures, which reject the null hypothesis more

easily, are frequently employed when one has good theoretical or empirical reasons for predicting the direction of a difference. In the present analyses, for instance, one would be unlikely to look for systematic reasons why the impact of BART apparently increased as distance from the system increased since one has good reason to believe it decreases. If one-sided testing procedures were employed in this sketch of a more sensitive test, a critical value only half as large (for two comparisons) or less (for more than two) would suffice to reject the null hypothesis.

This sketch suffices to indicate why in these analyses we have been especially interested in a consistent pattern of differences even though it is not sufficient to cause us to reject the null hypothesis according to rules indicated by the sign test.

ENVIRONMENT PROJECT DOCUMENTATION

- Environmental Impacts of BART:
Final Report*
(DOT-BIP-FR 7-4-77)
- Responses of Nearby Residents to
BART's Environmental Impacts*
(DOT-BIP-TM 25-4-77)
- Indirect Environmental
Impacts*
(DOT-BIP-TM 24-4-77)
- The User's
Experience*
(DOT-BIP-TM 23-4-77)
- Methodological Report: Responses of Nearby
Residents to BART's Environmental Impacts
(WN 4-4-77)
- Phase II Community
Monitoring
(WN 3-4-77)
- Phase II Addenda to
Direct Impacts
(WN 2-4-77)
- Phase II Project
Implementation Plan
(PD 20-4-75)
- Interpretive Summary:
Interim Service Findings
(1976)
- Environmental Impacts of BART:
Interim Service Findings*
(DOT-BIP-FR 2-4-75)
- Impacts of BART on the Social Environment:
Interim Service Findings*
(DOT-BIP-TM 19-4-76)
- Impacts of BART on Visual Quality:
Interim Service Findings*
(DOT-BIP-TM 18-4-76)
- Impacts of BART on the Natural Environment:
Interim Service Findings*
(DOT-BIP-TM 17-4-76)
- Acoustic Impacts of BART:
Interim Service Findings*
(DOT-BIP-TM 16-4-76)
- Impacts of BART on Air Quality:
Interim Service Findings*
(DOT-BIP-WP 20-4-76)
- Analysis of Pre-BART Urban Residential
Environment Survey*
(DOT-BIP-WP 24-4-76)
- Theory Background for Study of BART's
Impacts on Human Perception and Response*
(DOT-BIP-WP 23-4-76)
- Community
Monitoring*
(DOT-BIP-WP 22-4-76)
- BART and Its Environment:
Descriptive Data
(WN 1-4-76)
- Research
Plan
(PD 9-4-75)
- Phase I
Work Plan
(PD 4-1-74)

* Document is available to the public through the National Technical Information Service (NTIS), Springfield, Virginia 22151. Other documents are MTC internal working papers.

STUDY PARTICIPANTS

Consultant Team

Gruen Associates, Inc.

Ki Suh Park
Project Director
Donald Graff
Project Manager

De Leuw, Cather & Company

Robert Knight
Assistant Project Manager

Bolt Beranek & Newman, Inc.
Curtis Associates
Institute for Research in Social Behavior
TRW, Inc.

West Coast Community Surveys
Dr. Mark Baldassare
Dr. Frances M. Carp
Dr. Eugene Grigsby
Dr. Eugene Leong
Dr. Martin Wachs

Performing Organization

Metropolitan Transportation
Commission

Sponsoring Organizations

U. S. Department of
Transportation
U. S. Department of
Housing and Urban Development



